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METAL INDUSTRY

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ELECTRO-PLATERS REVIEW

Volume 32, Number 3 MARCH, 1934 Two Dollars Per Year

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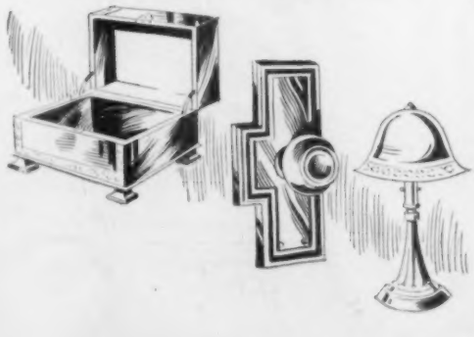

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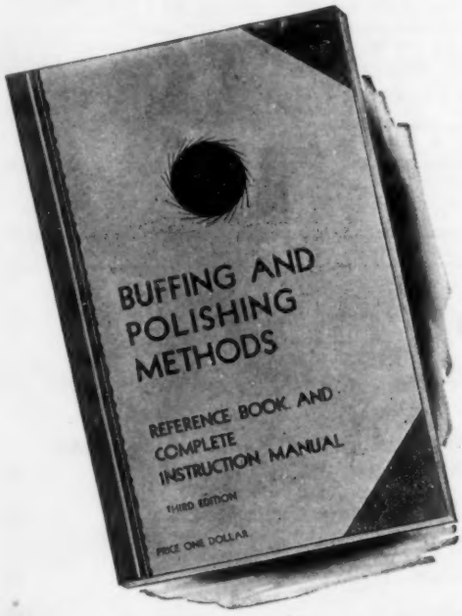

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ELECTRO-PLATERS REVIEW

Vol. 32 NEW YORK, MARCH, 1934 No. 3

Institute of Metals Division Meeting

Metallurgists Discuss Copper, Zinc, Aluminum, Magnesium, Nickel, Gold, Silver and Their Alloys. Round Table on Metals in the Electrical Industry

THE annual winter meeting of the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers was held in New York at 29 West 39th Street, February 20th-22nd inclusive. The meetings were well attended especially in view of the bad weather which prevailed at that time, and the programs full of interest.

New Officers

The following are the new officers who were elected:

Chairman—John L. Christie, Bridgeport Brass Company, Bridgeport, Conn.

Vice-Chairman—W. M. Pierce, New Jersey Zinc Company, Palmerton, Pa.

Vice-Chairman—W. A. Scheuch, Nassau Smelting & Refining Company, Staten Island, N. Y.

Secretary—E. M. Wise, International Nickel Company, Bayonne, N. J.

Executive Committee: J. A. Gann, Dow Chemical Company, Midland, Mich.

G. O. Hiers, National Lead Company, Brooklyn, N. Y.

R. H. Leach, Handy & Harman, Bridgeport, Conn.

Those portraits which were available are shown below.

JOHN R. CHRISTIE
Chairman

W. A. SCHEUCH
Vice-Chairman

E. M. WISE
Secretary

Special Features

The regular features of the winter meeting were offered. The Annual Institute of Metals dinner was held on Tuesday, February 20th, at 6:30 P.M. at the Commodore Hotel. A change was made from the usual order. The regular non-technical after dinner talk was not devoted to metals, but was a lecture entitled "Mining for Brains" delivered by E. S. Humphrey on the characteristics and training of dogs.

The annual Institute of Metals Lecture was delivered by Professor L. W. McKeehan, director of the Sloan Physics Laboratory, Yale University, New Haven, Conn. Dr. McKeehan spoke on Ferro Magnetism in Metallic Crystals.

Technical Papers

The following are abstracts of the technical papers read on non-ferrous metals and their alloys.

Internal Stresses in Quenched Aluminum and some Aluminum Alloys

By L. W. Kempf, H. L. Hopkins and E. V. Ivanso

1. The conditions utilized commercially in the heat treatment of aluminum alloy castings and forgings are such as to produce in simple shapes stresses of the same order of magnitude as the errors of the methods used in this investigation.
2. Under extreme conditions, involving the quenching in ice water of heavy sections from temperatures considerably above those used in ordinary practice, stresses of the same order of magnitude as the yield strength of the alloy may be induced in the heat-treated product.
3. The magnitude of stresses induced by heat treatment are influenced by the mechanical and physical properties of the alloy, the rate of cooling, and the volume and geometry of the specimen.
4. Stresses in simple shapes are compressive in the surface and tensile at the center of the specimen.
5. In cylindrical specimens the longitudinal stresses are of a higher order of magnitude than the tangential and radial stresses which are about equal at the center of the specimen.
6. To bring about in relatively short periods of time a substantial reduction in internal stress, reheating to temperatures in excess of about 500°F. (260°C.) is necessary.

Testing the Drawing Properties of Rolled Zinc Alloys

By E. H. Kelton and Gerald Edmunds

The purposes of this paper are to describe the use of adjustable cut and draw tools as a control test of of drawing properties and to point out that no other well-known test or combination of tests determines this quality in zinc and zinc alloys.

Other investigators have developed machines for testing the drawing qualities of metals. Some of these machines yield valuable information on the stresses and pressures involved in drawing. The accurate determination of drawing quality alone, however, seems to be most economically and dependably accomplished by means of the combination of tools described above.

Comparative Studies on Creep of Metals Using a Modified Rohn Test

By C. R. Austin and J. R. Gier

Data have been presented on elementary metals and commercial alloys to illustrate how the temperature-time curves, obtained by means of a modified form of the Rohn test and resulting from plastic deformation, serve as a ready means of making comparisons of the creep characteristics of metals at elevated temperatures.

A convenient means of classification has been discussed whereby an approximate relationship is expressed between load-carrying capacity and temperature for any given metal. A series of curves for iron, nickel and cobalt illustrate this method of sorting metals.

The relationship between rate of creep and temperature with the four loads studied for iron, nickel and cobalt indicates that the rate of creep increases much faster than temperature. This accords with general observations on effect of temperature on creep rate.

The effects of minute amounts of plastic deformation on resistance to further creep have been studied. The importance of these effects on the modus operandi of test have been discussed, and it has been shown that they tend to assume minor importance in the higher temperature ranges.

The information and analysis of data presented in the paper appear to substantiate the contention that this modified Rohn method of testing provides a valuable means of studying the high-temperature properties of materials.

The Lithium-Magnesium Equilibrium Diagram

By Otto H. Henry and Hugo V. Cordiano

The equilibrium diagram for the lithium-magnesium system of alloys has been determined. The liquidus was obtained from a series of cooling curves, the solidus from a series of heating curves, and the limits of solid solubility from a series of heat-treating and quenching experiments. While it is probable that the time of annealing was not sufficiently long to obtain equilibrium, it is felt that the solid solubility limits as indicated are substantially correct. The diagram shows that lithium and magnesium are completely soluble in the liquid state, that they are partially soluble in the solid state, and that there is a transition where a peritectic reaction takes place.

Having determined the equilibrium diagram, the next step will be an investigation of the mechanical properties of these alloys and the possibility of improving them by mechanical working and heat treating. Results of such an investigation, which is now in progress, will be published later.

X-ray Studies on the Nickel-Chromium System

By Eric R. Jette, V. H. Nordstrom, Bernard Queneau and Frank Foote

The equilibrium diagram of nickel-chromium alloys of a high degree of purity has been studied by X-ray

methods of investigating crystal structure. It has been shown that at temperatures below 1150°C. this system consists of two terminal solid solutions with an intervening two-phase area. On the chromium side of the system the solubility of nickel in chromium is low but increases rapidly at temperatures above 900°C. The solubility of chromium in nickel increases at a rapid but fairly uniform rate as the temperature increases. The solubility found at 1113° C. is nearly 53 wt. per cent chromium, which is beyond the eutectic point as determined by thermal analysis. Reasons for this discrepancy are discussed. No structures were found other than the body-centered chromium lattice, the face-centered nickel lattice and, occasionally, the rhombohedral structure of Cr_2O_3. The latter substance has been isolated as inclusions from high-chromium alloys.

An X-ray Study of the Gold-Iron Alloys

By Eric R. Jette, Willard L. Bruner, and Frank Foote

The gold-iron system has been studied by X-ray methods, particularly at temperatures below the α-γ transformation of iron. It has been established that in this range of temperatures only the two limiting solid solution phases occur. The limits of these solid solutions have been determined at several temperatures. The ferromagnetic character of the solid solutions containing from 10 to 15 per cent by weight of iron has been noted. A series of experiments is reported, which shows that precipitation-hardening of the alloys high in gold is possible.

Crystal Orientations Developed by Progressive Cold-Rolling of an Alloyed Zinc

By M. L. Fuller and Gerald Edmunds

An investigation of the crystal orientations developed by the progressive cold-rolling of a zinc alloy (1.0 per cent copper, 0.01 per cent magnesium, remainder zinc) is described. The orientation structures are determined by the X-ray method and the results are given diagrammatically as pole figures. Cold-rolling yields three types of preferred orientation. One type, in which the principal axes of the crystals are approximately parallel to the rolling direction, has not previously been reported in the literature. The structures are rationalized in terms of the mechanisms of deformation of zinc crystals, basal slip and pyramidal twinning, and the changes of form undergone by the metal during rolling.

Influence of Silver on the Softening of Cold-Worked Copper

By H. C. Kenny and G. L. Craig

A small fraction of one per cent of silver in high-conductivity tough-pitch copper increases the softening temperature of the cold-worked material. The silver is effective in raising the softening temperature both for very short anneals and for heating times of months. The softening temperature increases rapidly until the silver content reaches 10 oz. per ton (0.034 per cent), and then slowly with further increase in silver content. Cold-worked copper containing almost no silver is completely softened on heating for a few days at 150° C., while copper of the same hardness containing over 10 oz. per ton (0.034 per cent) of silver is not greatly softened when maintained at this temperature for a year. As much as 40 oz. per ton (0.14 per cent) of silver has no adverse effect on the mechanical properties, nor does it lower the electrical conductivity appreciably.

Solubility of Oxygen in Solid Copper

By F. N. Rhines and C. H. Mathewson

The solid solubility of oxygen in copper has been measured in the range 600° to 1050°C. and was found to increase from 0.007 per cent oxygen at 600° C. to about 0.015 per cent oxygen at 1050° C.

Indirect microscopic evidence of the precipitation of cuprous oxide in solid copper supersaturated with respect to oxygen has been presented.

The solubility values reported are shown to be in fair agreement with those reported by Hanson, Marryat and Ford and Allen and Street, but do not agree with the values found by Vogel and Pocher. A possible explanation of the disagreement of the latter is offered.

It has been demonstrated that oxygen can be extracted from solid copper by heating in the absence of oxygen.

Experimental evidence of the decomposition of solid cuprous oxide at low pressures is also presented. The significance of this observation in the construction of a pressure-temperature diagram of the system copper-cuprous oxide has been illustrated.

Strength and Aging Characteristics of the Nickel Bronzes

By E. M. Wise and J. T. Eash

The alloys considered in this paper range from 0 to 12.5 per cent tin and from 0 to 15 per cent nickel, together with numerous alloys containing both tin and nickel. The methods employed for the production of the test castings are briefly outlined while the tensile properties obtained are given in detail. Aging characteristics of the sand-cast nickel bronzes are studied and data are presented regarding the physical properties of the annealed and aged sand-cast alloys. The relation between the tensile strength, proportional limit and the elongation of the 7.5 per cent nickel 8 per cent tin alloy after various aging treatments is presented.

The effects of various additions to the 7.5 per cent nickel 8 per cent tin alloy are considered in reference to their influence upon the strength and aging characteristics. Practical considerations dictating the use of the nickel bronzes are briefly considered, as are the production and aging characteristics of the wrought nickel bronzes.

Round Table Discussion of Non-Ferrous Metals in the Electrical Industry

High Conductivity Non-ferrous castings in Electrical Apparatus and equipment, by L. Zickrick.

The conductivity of copper castings depends upon keeping down the oxygen contained. Mr. Zickrick discussed various deoxidizers, pointing out that it was necessary to use deoxidizing agents which would not reduce the conductivity through the residual material left in the casting. The best deoxidizers are those which will not dissolve in copper, such as calcium, calcium boride, boron carbide, etc.

Aluminum Conductors, by M. E. Noyes. Aluminum conductors are over 40 years old. They were first

used for busbars and telephone wire. The use of aluminum in these industries has grown at about the same rate as total power consumption. Most of the aluminum now used in this field is in the form of stranded wire cable for power transmission, these cables carrying from 4000 to 220,000 volts. Aluminum competes with only about 5 to 10 per cent of the total copper consumption. In 1910 came the aluminum cable, steel reinforced (known as A.C.S.R.). At the present time there are over 400,000 miles of aluminum cable in use.

Copper Contacts, by R. H. Schatzel. The author discussed the forms into which copper is made for the electrical industries. Wire is made as fine as 0.008" and up to very heavy cable of complex shapes.

Alloy Contacts, by W. H. Bassett, Jr. Mr. Bassett described the wide variety of uses and forms of alloy contacts varying from bronze lead-in contacts to brass pins.

In the discussion which ensued, W. A. Wood asked for opinions about the relative merits of copper and aluminum as conductors, expressing his surprise that this question had not come up for discussion.

Non-Ferrous Magnetic Alloys, by T. D. Jensen. The author described the magnetic properties and the properties that can be induced in iron-nickel alloys.

Vacuum Amplifying Tubes, by S. Umbreit. Mr. Umbreit explained the construction of vacuum amplifying tubes, the materials used for the various parts and the methods of assembly. The range of material covered almost all of the common metals and a number of rare metals.

Electrical Contact Alloys, by H. O. Siegmund. Mr. Siegmund showed the great extent and variety of precious metal contacts. These contact alloys were classified as follows:

For up to 1 ampere—palladium.
For less than ½ ampere—6 platinum, 69 gold, 25 silver.
For vacuum tubes—30 silver, 70 gold.
For sensitive apparatus—60 palladium, 40 copper.

In some cases other metals are used, such as tungsten, iridium-platinum or coin silver.

Cable sheathing and Soft Solders, by H. O. Hiers. Ordinary cable sheathing which is not subjected to vibration consists of about 99.8 lead. Where vibration is present the sheathing may be made of 97 lead, 3 tin; or 0.03-0.04 calcium, balance lead; or 0.06-0.08 tellurium, balance lead. The author discussed the physical tests for cable sheathing and the problems of installation and corrosion. He also described soft solders such as the commonly known 50 lead, 50 tin, and wiping solder, 60 lead, 40 tin. He mentioned a new solder containing 24 tin 9 cadmium and the balance lead.

Tungsten Filament Wires, by W. R. Sykes. Mr. Sykes described the properties of tungsten, the treatment necessary and the methods of manufacture into wire.

Removal of Arsenic and Antimony from Copper by Furnace Refining Methods, By W. J. Hillenbrand, R. K. Poull and H. C. Kenny. This paper described the soda ash method of eliminating arsenic from molten copper which consists of blowing powdered sodium carbonate under the surface of the partially oxidized melt and in removing the slag formed which will contain a certain proportion of the arsenic formerly in the bath. Sodium carbonate melts readily at the temperature of molten copper, and when molten, it dissolves arsenic oxide rather rapidly. In the process, sodium arsenate is formed which is removed along with the excess of molten soda ash. In order that arsenic may be eliminated in this way, it must first be oxidized to the pentavalent condition. This, however, is easily accomplished by blowing air into the molten copper until a fair excess of cuprous oxide is present.

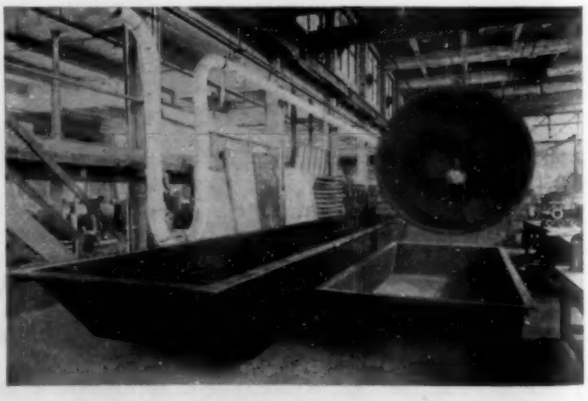
Development and Uses of Anaconda Electro-sheet Copper, by William M. Shakespeare. Thin sheet copper in wide widths and long lengths is being made electrolytically on a commercial scale at the Raritan Copper Works, Perth Amboy, N. J. Metal is deposited on some form of endless cathode, of which a revolving cylinder or drum is the most common. The cathode moves slowly and at such a rate that metal of the desired thickness is deposited during one pass through the electrolyte. The deposited metal is stripped off the cathode at a point above the solution level and after washing and drying is wound up immediately. Another part of this process consists of increasing the thickness of a band of thin metal by guiding it through an electrolytic tank in opposition to suitable anodes.

Notes on the Purification of Electrolytes in Copper Refining, by E. S. Bardwell and R. J. Lapee. This paper describes the changes which have taken place at the electrolytic copper refinery of the Anaconda Copper Mining Company at Great Falls, Mont., in the methods of removing impurities from tank room electrolyte and controlling its acid content. These changes include the replacement of the old works by a new and modern plant capable of producing up to 27,000,000 pounds of copper per month. In spite of the new problems which have arisen through changes in metallurgical practice at the smelter and the leaching of silver slime to remove copper before shipment to the refinery, the long standing methods of purifying the electrolyte described twenty years ago* are still adequate for the needs of this plant.

*W. T. Burns. Notes on the Great Falls Electrolytic Plant, Transactions, A. I. M. E. (1913) 46.703.

Correction

In our February issue page 54, we published the illustration shown below with the caption "Plating Tanks Lined With Rubber by the Anode Process." This caption was in error. It should have read "Plating Tanks Lined With Rubber by the Ace Process." The article described the use of hard rubber tank linings in the electroplating plant and was written by D. D. Wilkins of the American Hard Rubber Company, New York.



Plating Tanks Lined With Rubber by the Ace Process

Silverware Code in Operation

Code of Fair Competition for the Silverware Manufacturing Industry As Approved on December 23, 1933

A LETTER accompanying this Code from General Johnson, Administrator to the President, read in part, as follows:

"The maximum hours permitted under this Code are forty (40) per week. During peak demand periods employees may be permitted to work forty-eight (48) hours per week, provided that the average for any three months period does not exceed forty (40) hours per week. Provision is made for the employment of hub and die-cutters for forty-eight (48) hours per week, but this class of employee shall not exceed 5 per cent (5%) of the total number of employees. Watchmen and engineers may work forty-two (42) hours when averaged over any two week period. Members of the Industry while doing productive work shall come under the maximum hours provided for in the Code.

"The minimum wage is thirty-five cents (35c) per hour. Provision is made for learners, who are to be paid eighty per cent (80%) of the minimum wage for a three months learning period, but this class of employee shall not exceed 5% of the total number of employees. Aged employees to the extent of 2% of the total employees shall be paid not less than eighty per cent (80%) of the minimum wage. Provision is made for an equitable adjustment of all wages above the minimum.

"Silverware is a luxury. The raw materials which are used are costly and this must be recognized in considering the problems of production. This should undoubtedly be given much consideration in seeking to account for the rapid decline of the industry since 1929, at which time the total value of the products of the industry were $85,800,000.00. This had declined in 1932 to $33,000,000.00. There was a loss of 29 firms operating in the industry from 1929 to 1933.

"It should also be emphasized that the business is largely seasonal since the sales are mostly made at certain seasons, viz, Fall, May and June for Weddings, and Christmas. For that reason it is important that the hours be averaged down to forty (40) per week over a three-months period rather than a flat forty (40) hour week.

"Style, fluctuations in price of silver, and other materials and demand play a large part in this industry, and it is almost impossible to anticipate demands, thus leaving no possible way of so spreading out the work and the sales over several months so as to relieve congestion and give steady employment to the workers and thus prevent the "dull" season.

"In April, 1933 there were 1,572 unemployed workers in this industry. Between April and October, 1933 there has been a 20% increase in employment and approximately 17% increase in the average hourly rate of pay."

Definitions

The term "Industry" as used herein shall mean the manufacture of Sterling silverware, platedware, pewter; the manufacture of table knives, forks, spoons, and other flatware, hollow ware, toiletware, ornaments, Ecclesiastical ware, novelties, etc., where such articles are composed of solid silver, of metal plated with silver, gold, or other metal, or of nickel silver, or of pewter.

The term "Institute" as used herein shall mean the Silverware Manufacturers Institute, (Headquarters, 20 W. 47th Street, New York).

The term "division" refers to the several parts of the industry which are or may be established by the Institute under the definitions in Section 1, as follows:

1. Plated Flatware
2. Plated Hollow Ware
3. Plated Toiletware and Novelties
4. Hotelware—Flatware and Hollow Ware
5. Pewter, Chromium Plate and Miscellaneous
6. Sterling Flatware
7. Sterling Hollow Ware
8. Sterling Toiletware
9. Sterling Novelties

Hours, Wages and Labor Provisions

Hours and wages are as given in General Johnson's letter above. Labor provisions are those generally provided in Codes, with the addition that no member of the Industry shall distribute or permit to be distributed, directly or indirectly, work of any kind to be done in home or homes.

Administration

The Code Authority shall consist of the Executive Council of the Silverware Manufacturers Institute, and in addition thereto, not more than three (3) members, without vote and without compensation from the Industry to be appointed by the Administrator and to serve for such time as he may designate.

The Code Authority shall have the following duties and/or powers in addition to those elsewhere provided in this Code, subject to the right of the Administrator to disapprove any action taken by the Code Authority.

To administer the provisions of this Code and provide for the compliance of the industry with the provisions of the Act.

To establish an adequate system of cost accounting, capable of uniform application within the Industry, which, when approved by the Administrator, shall be used by all members of the Industry as a basis for cost finding.

To recommend to the Administrator further fair trade practice provisions to govern members of the Industry in their relations with each other, or with other industries, and to recommend to the Administrator measures for industrial planning, including stabilization of employment.

The Code Authority shall, within sixty (60) days after the effective date of this Code, establish a series of quality standards to mark the various grades and qualities of the products of the industry, which when approved by the Administrator, may be used by all members of the industry.

Trade Practices

In addition to the usual clauses concerning rebates, commercial bribery, mis-branding, espionage, defamation of competitors, etc., following points are made:

No member of the Industry shall sell any product of the Industry below his individual cost figure, as determined by the cost accounting system to be established by the Code Authority and approved by the Administrator; or fail in the case of "group" sales to price and bill separately the individual prices of the articles comprising said "groups," provided, however, that any member of the Industry may, in order to meet bona fide competition in any specific instance, sell at the lowest reasonable cost within the Industry, as determined by the Code Authority and approved by the Administrator, nothwithstanding such lowest reasonable cost may be less than his individual cost, and provided further, that obsolete and/or discontinued merchandise may be sold at less than cost if it is not deliberately manufactured in such manner as tends to frustrate the spirit and intent of this Code. All sales below cost as permitted above, and all sales of such obsolete and/or discontinued merchandise shall be reported to the Code Authority within five (5) days of the date of the sale, giving the name and address of the purchaser, the date and the amount of the sale, together with any other pertinent information requested by the Code Authority.

No member of the Industry shall permit any buyer to return any merchandise, other than nationally advertised merchandise or samples not intended for resale, when the agreement of sale is fully performed by such member. No member of the Industry shall permit articles which carry a nationally advertised price to be returned by virtue of this section unless the buyer is charged with the cost of transportation and a minimum refinishing and/or rehandling charge of ten per cent (10%) in the case of plated ware and five per cent (5%) in the case of all sterling ware returned as provided for in this section. Nothing in this section shall be construed to prevent a member of the Industry from accepting the return of merchandise for legitimate credit reasons, when the return is approved by the Code Authority and/or the Administrator.

No member of the Industry shall ship any merchandise having a cost of less than ten dollars ($10.00) net unless there shall be added to the invoice and collected from the customer a package charge of twenty-five cents (25c).

No member of the Industry shall ship any merchandise except sterling ware on memorandum or consignment or sell such merchandise with the privilege of returning all or any portion of same.

No member of the Industry shall ship any sterling ware on memorandum or consignment to remain in the dealer's hands for a period longer than fourteen (14) days. On all such memorandum or consignment shipment the dealer shall be charged with all transportation charges, and if such sterling ware is not returned within the period herein specified, the dealer shall immediately be billed for same and the invoice therefor shall clearly set forth the original shipping date and the date of receipt of such sterling ware by the dealer, and shall not be subject to return, except for legitimate credit reasons, when such return is approved by the Code Authority and/or the Administrator.

No member of the Industry shall publish or otherwise announce any guaranty, whether limited or unlimited, for a specified period of time in connection with the lasting or wearing qualities of plated ware, or encourage or continue to sell to any distributor or dealer who persists in publishing or otherwise announce such a guarantee in connection with the plated ware of the manufacturer concerned.

No member of the Industry shall submit contract proposals for hotel ware on other than standard forms to be established by the Code Authority, which shall include definite specifications in regard to base metal, weights of blanks of flatware for patterns that are regularly made in more than one weight, solder, silver plating standard, patterns, special markings, terms, and unit prices, and the date of such proposal, and unless specifications have been changed, no member of the Industry shall change his unit price on proposals already submitted, when such change is made to secure award of the contract by reducing such prices below one or more other bidders.

No member of the Industry shall fail to charge for the cost of special consumer marking dies or stamps for hollow ware or flatware, or for the cost of marking consumer's names, monogram, or crest, whether stamped, hand engraved, etched, or applied on hotel hollow ware and flatware.

Where a special pattern in hotel ware is made for the exclusive use of a consumer, no member of the Industry shall fail to charge for the cost of dies or tools necessary to produce the same, but upon payment thereof, such dies or tools for which such charge is made shall become the property of the consumer who pays for them.

Plating Research to Be Continued

IN our February issue on page 52 we published an announcement of the fact that the research work carried on by the Bureau of Standards on the Protective Value of Electroplated Metal Coatings on Steel was discontinued as of February 1, 1934.

We are glad to state that we recently received a notice from Dr. Blum of the Bureau of Standards that work was not discontinued. On February 1st, Dr. Blum was informed that United Chromium, Inc., had offered to underwrite the investigation for at least a few months pending the securing of additional funds by the American Electroplaters' Society. United Chromium, Inc., feel that the work is of too great importance to be discontinued, and while it is not their intention to bring about a condition whereby it will be financed by any particular company (nor is this the idea of the Society), they nevertheless have undertaken, during the period of emergency, to contribute the amount necessary to pay the salary of the Associate at the Bureau.

Plans are now being made by the American Electroplaters' Society for a campaign for funds to continue this research and to extend it to plating on non-ferrous metals.

Secondary Aluminum Industry Code

THE Code of fair competition for the Secondary Aluminum Industry became effective February 23, 1934. In accordance with the provisions of this Code, meetings of the membership of the Aluminum Research Institute and of all manufacturers of secondary aluminum were held on February 21 and 22 respectively.

At its meetings, the following were chosen in the manner prescribed, to serve as the personnel of the Code Authority for the Secondary Aluminum Industry for one year or until their successors are elected and qualified.

D. K. Ewing, Secretary-Treas.
Aurora Refining Company
Aurora, Illinois

W. A. McKnight, President
William F. Jobbins, Inc.
Aurora, Illinois

J. B. Neiman, Manager
Federated Metals Corporation
Detroit, Michigan

W. A. Singer, President
Apex Smelting Company
Chicago, Illinois

Walter M. Weil, Treasurer
The National Smelting Co.
Cleveland, Ohio

Following these meetings, the gentlemen chosen as members of the Code Authority for the Secondary Aluminum Industry met and organized. The Code Authority selected Walter M. Weil to act in the capacity of Chairman and W. A. McKnight as Vice-Chairman. R. D. T. Hollowell, 308 W. Washington Street, Chicago, was designated Secretary-Treasurer of the Code Authority and his office was made the office of the Code Authority. James B. Westcott of Sanders, Childs, Bobb & Westcott, Chicago and Washington was retained as Counsel for the Code Authority.

The important points of the Code are summarized in the Report from General Johnson, Administrator to the President, from which we quote, in part, as follows:

The Industry is nationwide in character. The factories are located with economic relationship to sources of aluminum scrap or aluminum bearing waste for refining and remelting and subsequent sale of industry products. In the main the plants are located east of the Mississippi River (St. Louis included), together with a few factories on the Pacific Coast. The Industry supplies ingots of secondary aluminum and aluminum alloys to the Steel Industry for use as a deoxidizer, to the Chemical Industry, for the Non-Ferrous Foundries for the production of aluminum or aluminum alloy castings, to the Automotive Industry for the casting of crank cases, etc., to the Building Industry for decorative trim, either rolled or cast, and to the Household Industry for rolled or cast cooking utensils, household equipment, etc.

The Industry came into being about 1910 with the increasing amounts of aluminum scrap that were available. Through the offices of the Aluminum Research Institute processes for refining of aluminum scrap and aluminum-bearing waste have been developed so that the Industry products for many applications are substantially equivalent to virgin aluminum. The growth of the Industry and its relationship to virgin aluminum is indicated in the following table. Based upon these figures (compiled by the Department of Commerce Bureau of Mines) the position of the Secondary Aluminum Industry is that the price of scrap aluminum and aluminum-bearing material may one day dominate the market price for the virgin material, as is the case in other kindred metal industries. It is interesting to note that the Aluminum Company of America represents less than 5% activity in the Secondary Aluminum Industry.

Year	Primary Tons	Secondary Tons	Percentage
1931	88,777	30,300	34
1930	114,517	38,600	34
1929	112,500	48,400	43
1928	105,000	47,800	46
1927	79,860	46,200	58
1926	72,380	44,200	61
1925	69,850	44,000	51
1924	75,130	27,000	36
1923	64,350	21,300	33
1922	36,960	16,200	44
1921	26,950	8,900	33
1920	68,860	15,500	22
1919	89,760	18,691	20
1918	112,200	15,050	13
1917	99,770	16,100	16
1916	69,410	19,300	27

The major portion of the tonnage of secondary aluminum is produced in plants primarily engaged in the manufacture of secondary aluminum and its alloys. However, a very considerable portion of the total tonnage is produced in plants that operate primarily for the production of alloys of some other nonferrous metal base. In such latter plants which produce a variety of alloys of different base, employees usually work interchangeably. It is therefore practically impossible to state the precise number of employees that are engaged in the production of secondary aluminum. In the original Code that was offered by the Secondary Aluminum Industry, an estimate of 500 employees was made and this figure is believed to be approximately correct, as of August 1, 1933, although the total number would now exceed this figure because of the substantial increase in employment which has been caused by this Industry's compliance with the terms of the President's Reemployment Agreement with exceptions as approved by the N.R.A.

Hours

The maximum hours are limited to 40 hours per week for employees engaged in the processing of products and labor incident thereto except that during any six weeks in any six months' period employees shall be permitted to work a maximum of 48 hours in any one week, with a few specified exceptions.

Wages

The minimum wage for employees engaged in the processing of products or in any labor incident thereto is at the rate of 35 cents per hour, with a few specified exceptions.

Marketing and Trade Practice Rules

Each member of the industry shall file with the Code Authority the prices at which he is offering his products for sale, which prices shall not be less than his current cost as determined by a uniform system of cost accounting provided that any member of the industry may file below his current cost so determined in order to meet the competition of any other member of the industry who has filed prices in accordance with this section.

A uniform sales contract shall be established and used by the industry, subject to the approval of the Administrator.

The following are among the unfair trade practices listed:

Selling below openly and publicly announced prices and terms.

Storage of products in consumers' warehouses, or sales on consignment to consumers, except under circumstances to be defined by the Code Authority, where peculiar circumstances of the industry make the practice advisable.

Guaranty against decline in price.

Substitution of any grade of aluminum and its alloys superior in composition to that specified, for the purpose of furnishing such material at prices lower than would otherwise prevail.

Entering into quantity contracts with buyers without obligation on their part to take delivery of the quantities specified in the contract or on the quotation for the purpose of giving special unwarranted prices.

Publishing or circulating unjustified or unwarranted threats of legal proceedings which tend to or have the effect of harassing competitors or intimidating their customers. Failure to prosecute in due course shall be evidence that any such threat is unwarranted or unjustified.

Requiring that the purchase or lease of any goods be a prerequisite to the purchase or lease of any other goods.

Conference on Electroplating

Held at the Wardman Park Hotel, Washington, D. C., Thursday, March 8, 10 A.M.

THIS meeting was held under the auspices of the Joint Inspection Committee of the American Electroplaters Society and the American Society for Testing Materials, on the day following the A.S.T.M. Symposium on Outdoor Weathering of Metals and Metallic Coatings.

The morning session was presided over by W. M. Phillips, chairman of sub-committees of the A.E.S. and A.S.T.M. on specifications for plated metals. It was devoted to a summary of the nearly completed exposure and laboratory tests of plated coatings on steel, and the possibility of basing specifications upon them. It is hoped that a simple classification can be made of the conditions under which electroplated steel is used, and that specifications can be formulated for each class. After full consideration, such specifications will later be submitted to the A.S.T.M., A.E.S., and other interested organizations for their adoption.

The afternoon session was led by C. L. Hippensteel, a member of A.S.T.M. Committees A-5 and B-3, who is familiar with various exposure tests that have been conducted. It will be devoted to plans for an extension of the joint exposure tests to include plating on non-ferrous metals such as copper, brass, zinc, zinc-base die castings, and aluminum. It is hoped that a tentative program can be formulated, to be carried out as rapidly as the funds obtained by the American Electroplaters' Society and other organizations will permit.

Air Tight Aluminum Castings

Q.—WE have a small aluminum sand casting which is used in connection with a certain product that we are manufacturing. These castings are subjected to a certain pressure of air during testing and we find that they are not air tight.

A.—There are several types of sealing solutions used for reclaiming castings that leak under pressure. One is linseed oil forced under pressure in the casting and baked about ½ hour at 250 to 300° F.

Another is a mixture of formaldehyde, resin and alcohol. Still another is the bakelite impregnating process that is said to give excellent results in salvaging defective castings.

We suggest that you write to the firm which manufactures these materials for complete description of the sealing solution to take care of leaks and weeps in aluminum castings. **W. J. Reardon.**

Melting Silver Chloride

Q.—KINDLY advise if there is any method of melting silver chloride without metalizing first with iron and sulphuric acid.

A.—Yes. You can take the washed and dried silver chloride, crush the lumps, mix it with soda ash, and melt it in a crucible in a gold-melting furnace. For every pound of silver chloride, use about 3/5 to 3/4 of a pound of the soda ash. Use either a graphite or sand crucible, and do not fill it more than half full at first, as the melt will boil up considerably. A little borax glass may be added to make the melt more fluid.

Heavy fumes will be given off, so be sure your flue is working well. Allow the process to go on until the bubbling ceases.

Jewelry Metallurgist.

Non-Ferrous Foundry Ingot Shapes

By PIERCE BARKER
Metallurgical Engineer, Detroit, Mich.

A Complete Description of the Characteristics Demanded of Ingots for Foundry Use. Practical Reasons for the Various Shapes Used. Visual Inspection Important—Part 4*

Tables of Foundry Data

Tables I, II, and III, on pages 90 and 91 furnish data of interest to foundries manufacturing or using for finished castings, the metals and alloys indicated in the drawings of shapes which follow.

The indicated pouring temperatures may have to be varied somewhat, according to the foundry conditions, but they furnish a figure to guide the melter.

content, (other things being equal). The amounts of antimony and other impurities naturally affect this range considerably. The solidification or melting range is used to advantage in the auto industry in soldering auto bodies, because the greater the solidification range, the more time the soldering operator has to manipulate the mushy wiping solder to advantage. Auto-body parts are joined by rivets and the joints must be filled in so that before the finish is

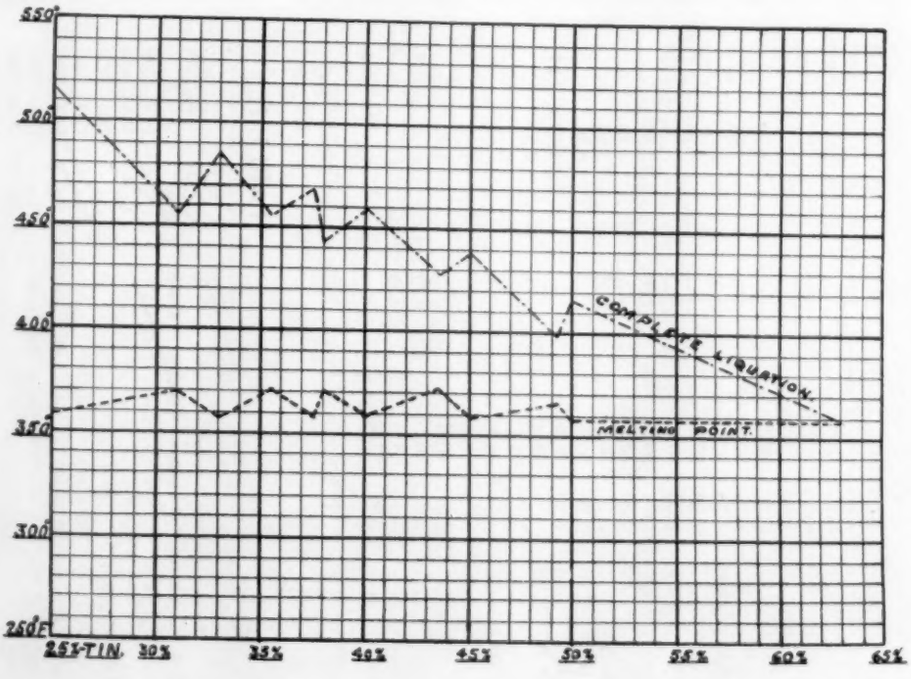


Plate S. Solidification Range of Various Solders

Plate "S" shows the solidification range of a number of solders. It also serves to indicate the melting points and points of complete liquidation. It will be seen that the greatest melting range occurs for 25:75 solders and that 63:37 consists entirely of eutectic, with, of course, the absence of any practical melting range. In the solder table given, there has been indicated the approximate melting-points of the solders listed, and also the pouring temperatures for capping bar, solder bar, notch bar and other solder shapes.

Referring to Plate "S", it will be noted that the solidification range of solders varies with the tin

applied, a continuous surface results, as though the body was made from one piece. Therefore the joints are filled in by wiping solder over them. The melting or solidification range is important in this operation, because the greater the range the longer the solder remains in a pasty condition, and the longer the wiper may manipulate it to form an unbroken body line and surface. The thirty per cent tin solder with 0.75 per cent antimony is used for this purpose as it is an economical solder to buy, flows freely and has a high solidification range. This solder has also a relatively high melting point and is therefore suitable for work where enameling and subsequent baking are required.

*Parts 1 to 3 were published in our issues for May, June and September, 1933.

TABLE I

Metals or Alloys	Copper	Zinc	Iron	Silicon	Aluminum	Nickel	Manganese	Magnesium	Max. Imp.	Melting Point ° F.	Pouring Temp. ° F.	Sp. Gr.	Pounds: Wt. Per Cu. Inch	Pounds: Wt. Per Cu. Ft.	Ultimate Tensile	Yield Point	% Elong. 2"	Brinnell Hardness	Shrinkage Per Foot
Copper	....	....	....	....	....	....	....	....	....	1981	2150-2300	8.60	.311	537	35,000	....	50	42	....
Tin	....	....	....	....	....	....	....	....	....	449	550	7.29	.263	455	4,000	....	35	14	....
Lead	....	....	....	....	....	....	....	....	....	621	725	11.37	.411	710	2,000	....	....	..	....
Antimony	....	....	....	....	....	....	....	....	....	1167	1250	6.71	.242	418	....	....	....	..	....
Arsenic	....	....	....	....	....	.. .	....	....	....	1562	....	5.73	.207	358	....	....	....	..	....
Zinc	....	....	....	....	....	....	....	....	....	787	850	7.14	.258	445	12,000	....	....	48	....
Iron	....	....	....	....	....	....	....	....	....	2786	2950	7.30	.263	455	....	....	....	..	...
Silicon	....	....	....	....	....	....	....	....	....	2587	....	2.39	.086	149	....	....	....	..	....
Aluminum	....	....	....	....	....	....	....	....	....	1220	1300	2.56	.096	165	13,000	....	25	25	....
Nickel	....	....	....	....	....	....	....	....	....	2652	2850	8.70	.330	570	40,000	....	10	76	....
Manganese	....	....	....	....	....	....	....	....	....	2246	....	7.42	.268	463	....	....	....	..	....
Magnesium	....	....	....	....	....	....	....	....	....	1204	1275	1.74	.063	109	....	....	....	..	....
Chromium	....	....	....	....	....	....	....	....	....	2772	....	6.50	.235	406	....	....	....	..	....
Molybdenum	....	....	....	....	....	....	....	....	....	2500	....	8.56	.309	534	....	....	....	..	....
ALUMINUM—																			
Sand Cast Alloys																			
	7.00	2.5	1.5	....	88.25	....	....	....	0.75	....	1320-1400	2.86	.103	178	20,000	....	2.0	..	3/32"
92:8	8.00	0.20	....	....	90.10	....	....	....	1.70	....	1320-1375	2.83	.102	176	20,000	14,000	2.0	65	3/32"
95:5	0.60	0.20	0.80	5.25	92.95	....	0.20	tr	....	....	1375-1550	2.65	.096	165	19,000	9,000	4.0	40	on
87:13	....	....	....	13.00	85.30	....	....	....	1.70	....	1425-1600	2.64	.095	165	26,000	11,000	8.0	50	small
	*0.20	tr	0.50	0.20	99.00	....	....	....	....	1220	1300-1350	2.67	.096	167	14,000	3,000	20.0	25	castings
	....	....	....	....	96.5	....	2.00	....	1.50	....	1300-1350	2.74	.099	171	20,000	9,000	10.0	35	to
	4.50	....	....	5.50	88.30	....	....	....	1.70	....	1350-1450	2.75	.099	172	21,000	17,000	2.0	60	1/8" per
	12.00	....	....	....	86.30	....	....	....	1.70	....	1300-1400	2.92	.105	182	24,000	18,000	1.5	75	foot
	7.50	1.5	1.20	2.50	86.80	....	....	....	0.50	....	1300-1400	2.85	.103	178	19,000	14,000	2.0	70	on
	12.00	0.20	0.80	0.50	86.30	....	....	....	1.50	....	1300-1400	2.92	.105	182	19,000	15,000	0.0	70	large
	10.00	0.20	1.20	....	87.50	0.75	....	....	0.35	....	1300-1450	2.85	.103	178	26,000	21,000	0.5	90	castings
	4.00	....	....	....	92.5	2.00	....	1.5	....	....	1350-1450	2.73	.999	170	28,000	24,000	1.0	85	"
	2.50	10.00	1.25	....	86.25	....	....	....	....	....	1350-1450	2.93	.106	183	29,000	22,000	4.0	70	"
	4.00	.. .	....	....	Bal.	.	....	....	1.70	....	1300-1400	2.83	.102	176	32,000	16,000	8.0	65	"
	4.00	....	....	3.00	Bal.	....	....	....	1.70	....	1300-1400	2.83	.102	176	43,000	40,000	2.0	110	"
Magnesium Alloys	....	....	....	....	6.2	....	0.30	93.50	....	1135	1275-1350	1.78	.064	111	40,000	28,000	12.0	52	....
	....	....	....	....	8.1	....	0.30	91.60	....	1120	1275-1350	1.80	.065	112	45,000	30,000	10.0	56	....
Non-Shrink Al. Patterns	5.00	....	....	3.00	92.00	....	....	....	....	....	1225-1450	2.72	.098	170	....	....	....	..	....

*Not sand cast alone. Given because of interesting characteristics.

TABLE II

Copper	Tin	Lead	Zinc	Iron	Silicon	Aluminum	Nickel	Miscel.	Melting Point	Pouring Temp. ° F.	Sp. Gr.	Pounds: Weight Per Cu. In.	Pounds: Weight Per Cu. Ft.	Ultimate Tensile	Yield Point	% Elong. 2"	Red. in Area	Brin. Hard.	Shrink. Per Foot
94.8	5.0	....	....	....	.....	.....	....	P 0.20	....	1950-2100	8.7	.317	546	37,000	17,000	25	28	53	7/16"
85	10	5	....	....	.....	.....	....	....	....	1860-2050	8.7	.314	543	31,500	20,500	8	8	55	3/16
89	....	....	....	1.0	.....	10.0	....	....	....	1800-2050	7.5	.270	467	70,000	28,000	20	20	135	5/32
89	6	2	3	....	.....	.....	....	....	....	1900-2100	8.6	.310	535	35,000	17,000	24	24	46	3/16
88	10	0	2	....	.....	.....	....	....	....	1900-2100	8.7	.313	543	30,000	15,000	14	19	65	3/16
88	10	2	0	....	.....	.....	....	....	....	1900-2100	8.7	.316	542	30,000	12,000	10	10	49	3/16
86	9.5	2.5	2.0	....	.....	.....	....	....	....	1850-2100	8.6	.311	536	35,000	18,500	20	18	58	3/16
85	8	2.5	4.5	....	.....	.....	....	....	....	1875-2100	8.6	.310	535	33,000	.....	28	28	60	3/16
85	5	5	5	....	.....	.....	....	....	....	1900-2100	8.6	.310	535	30,000	12,000	18	18	55	1/8

TABLE II (Continued)

Copper	Tin	Lead	Zinc	Iron	Silicon	Aluminum	Nickel	Miscel.	Melting Point	Pouring Temp. ° F.	Sp. Gr.	Pounds: Weight Per Cu. In.	Pounds: Weight Per Cu. Ft.	Pounds: Ultimate Tensile	Pounds: Yield Point	% Elong. 2"	Red. in Area	Brin. Hard.	Shrink. Per Foot
87	8	2	3	....	.....	.....	....	....	....	1900-2100	8.51	.308	531	30,000	14,000	12	..	..	...
83	7	7	3	....	.....	.....	....	....	....	1850-2100	8.65	.313	540	29,000	.....	16	18	55	3/16
84	3	3	10	....	.....	.....	....	....	....	1875-2075	8.60	.310	535	34,000	.....	30	25	55	3/16
85	5	9	1	....	.....	.....	....	....	....	1875-2100	8.65	.313	540	28,000	12,000	11	10	50	3/16
83	4	6	7	....	.....	.....	....	....	....	1850-2050	8.6	.310	535	32,000	.....	30	25	45	3/16
80	3	7.5	9.5	....	.....	.....	....	....	....	1825-2025	8.65	.313	540	25,000	.....	13	13	53	3/16
78	3	5.5	13.5	....	.....	.....	....	....	....	1800-2000	8.65	.313	540	28,000	.....	20	23	50	3/16
71	1.5	3.5	24.0	....	.....	.....	....	....	....	1750-1900	8.60	.310	535	33,000	.....	40	30	45	3/16
69	1	3	27	....	.....	.....	....	....	....	1750-1900	8.60	.310	535	33,000	.....	30	25	45	3/16
66	1	2	31	....	.....	.....	....	....	1650	1750-1900	8.60	.306	533	33,000	.....	30	25	50	3/16
62	1	2	35	....	.....	.....	....	....	....	1750-1900	8.0	.289	500	38,000	12,000	20	25	50	1/4
80.0	10.0	10.0	....	....	.....	.....	....	....	....	1850-2000	8.9	.320	553	28,000	14,000	8	10	50	3/16
77.5	11.0	11.0	0.50	....	.....	.....	....	....	....	1800-2000	8.9	.320	553	30,000	.....	8	9	50	3/16
74	8	16	2	....	.....	.....	....	....	....	1750-2000	9.1	.324	570	28,000	.....	14	13	48	3/16
72	5	18	5	....	.....	.....	....	....	....	1750-1950	9.1	.324	570	28,000	.....	13	10	50	3/16
72	6	21	1	....	.....	.....	....	....	....	1750-2000	9.1	.324	570	24,000	.....	13	10	45	3/16
70	5	25	....	....	.....	.....	....	....	....	1750-1950	....	....	...	20,000	13,500	9	..	48	...
57.5	0.75	....	40.0	0.75	.....	0.75	....	MN 0.25	....	1800-1950	8.40	.303	523	70,000	35,000	20	20	110	5/32
84.75	....	....	....	3.5	.....	11.75	....	....	....	1900-2100	7.85	.284	490	65,000	20,000	20	20	180	...
50.0	....	2.0	28.5	0.50	.....	0.50	18.5	....	....	2100-2400	8.22	.297	513	66,000	46,000	9	..	..	

TABLE III

	Copper	Tin	Lead	Antimony	Iron	Arsenic	Zinc and Aluminum	Melting Point ° F.	Pouring Temp. ° F.	Sp. Gr.	Wt. Per Cu. Inch	Pounds: Wt. Per Cu. Ft.	Pounds @ 212° F.: Ultimate Tensile	Pounds @ 212° F.: Yield Point	Brinnell
Solders	.05 Max.	25.0	74.85	0.15	...	...	Nil	358	650	....	....	....	....	....	...
	.05	33.0	66.70	0.20	...	...	"	355	635	....	....	....	....	....	...
	.05	38.0	61.75	0.25	...	...	"	353	620	....	....	....	....	....	...
	.05	40.0	59.50	0.50	...	...	"	365	590	....	....	....	....	....	...
	.05	45.0	54.50	0.50	...	...	"	365	575	....	....	....	....	....	...
	.05	50.0	49.25	0.75	...	...	"	370	550	....	....	....	....	....	...
	.05	50.0	49.85	0.15	...	...	"	360	565	....	....	....	....	....	...
	.05	60.0	39.45	0.50	...	...	"	360	525	...	....	....	....	....	...
	.05	63.0	36.80	0.20	.08	.10	"	360	510	....	....	....	....	....	...
Babbitts—Tin Base	4.50	90.50	0.50	4.50	.08	.10	Nil	433	780	7.34	.266	459	6940	2655	8.0
	3.50	89.0	0.35	7.50	.08	.10	"	466	800	7.39	.267	461	8710	3020	12.0
	5.75	86.75	0.75	6.75	.08	.10	"	...	800	7.35	.266	459	....	....	...
	7.50	84.25	0.75	7.50	.08	.10	"	465	825	7.46	.270	466	9895	3145	14.5
	3.00	75.00	10.0	12.0	.08	.15	"	365	710	7.52	.272	470	6905	2160	12.0
	2.0	65.0	18.0	15.0	.08	.15	"	358	695	7.75	.280	484	6745	2140	10.0
Babbitts—Lead Base	1.50	20.0	63.5	15.0	.08	.15	Nil	358	660	9.33	.338	583	8055	2060	10.5
	0.50	10.0	75.0	15.0	...	.20	"	464	640	9.73	.351	607	6155	1610	10.5
	0.50	5.0	80.0	15.0	...	.20	"	459	650	10.04	.362	625	6140	1760	9.5
	0.50	5.0	85.0	10.0	...	.20	"	459	630	10.24	.370	640	5845	1555	8.5
	0.50	2.0	83.0	15.0	...	.20	"	468	630	10.07	.362	625	5740	1840	9.0
	0.40	....	85.0	15.0	...	.25	"	471	635	10.28	.372	642	5110	1405	7.0
	0.40	....	90.0	10.0	...	.25	"	473	630	10.67	.385	666	5100	1260	6.5

This series of articles will be continued in an early issue—Ed.

A Progressive Plating Shop

By LEONARD F. HIRSH
Philadelphia Rust-Proof Company, Philadelphia, Pa.

PHILADELPHIA is one of the largest manufacturing centers of the United States. It has, however, many diversified industries, and the metal manufacturing industries are not as prominent as in some centers such as Newark, Detroit or Cleveland. For that reason it has been necessary for the Philadelphia Rust-Proof Company to diversify its activities and embrace all kinds of plating and rust-proofing.

In January, 1933, the new plant shown in the illustrations was occupied by the Philadelphia Rust-Proofing Company. A two story office building in front and an L-shaped one story building comprise the plant. The floor space occupied is approximately 15,000 square feet. Steam and power is generated by two 150 HP high pressure boilers. A general floor layout is shown below:

Fig. 1. Office of Philadelphia Rust Proof Company

As far as possible an effort has been made in the layout to have the related operations, such as polishing, and plating, near each other. An endeavor has also been made to have the work flow through in a manner that permits of the greatest economy. The polishing room shown faces the North and no effort has been spared to have this room as clean as possible—in contrast to many polishing rooms. The plating room shown contains cyanide copper, acid copper, die cast nickel and hot nickel solutions. In general, steel tanks lead lined are used whenever possible.

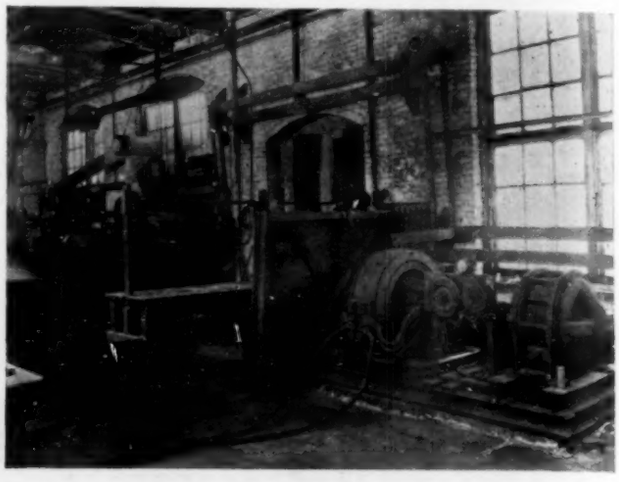


Fig. 3. 5000 Ampere Motor Generator Set and Some of the Chromium Tanks

The chromium plating department is also shown. Chromium plating is done under license from United Chromium, Inc. Facilities are provided for handling pieces as long as 15 feet, and overhead hoists allow

Fig. 2. Part of Polishing Room

for the handling of large and heavy pieces such as machine shafts, rolls, etc.

Cadmium plating is done by the Udylite process and a view of a large 15 foot tank and a semi-automatic conveyor is shown. Barrel plating is also provided for in this department.

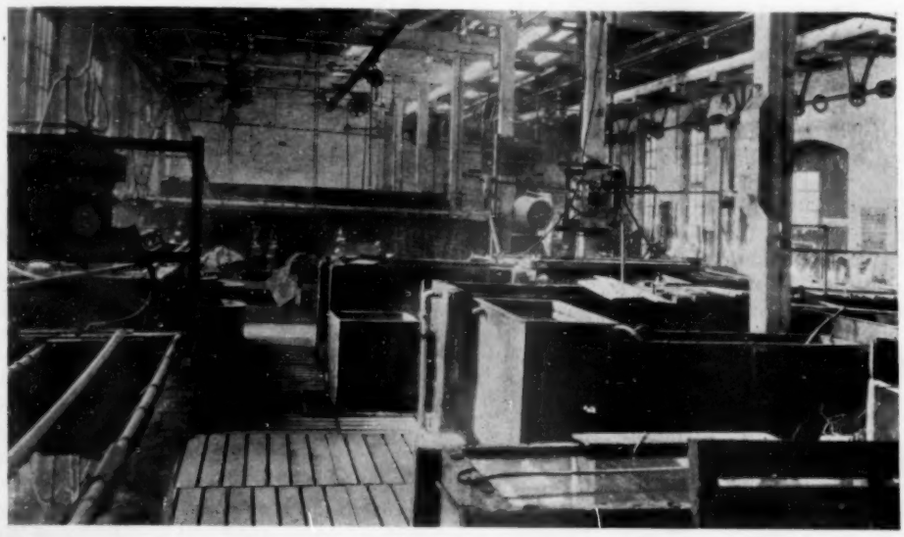


Fig. 4. Udylite Department Showing 15 Foot Cadmium Tank

Parkerizing is also done, and considerable attention has been paid to the application of this process to the ornamental iron, steel sash, structural steel industry.

Not only does the Philadelphia Rust-Proof Company handle the general line of miscellaneous decorative job plating, but careful attention is also being given to production work in plated coatings, whether they be tin, cadmium, nickel or chromium to the industrial field. Many industries have definite uses for electro-plated coatings that would not ordinarily be considered likely sources of plating work, and it is to these industries that the Philadelphia Rust-Proof Company look for expansion in business.

The company is owned by Gilbert Herbach and Leonard F. Hirsh, both chemical engineers, graduates of the University of Pennsylvania. Associated with them are other engineers, Raymond F. Clarke, Richard N. Hirsh and Ellwood Lanahan.

All solutions and baths are maintained by chemical analysis. Effort is made to try to bring the plating shop up to the level which it deserves as an electro-chemical plant serving the needs of many manufacturing industries.

Natural Patina Put on Copper by Artificial Means

THE development of a method for the artificial formation of natural patina on copper was announced recently by William M. Crane, Jr., of the Copper and Brass Research Association, in an address before the National Roofing and Sheet Metal Industries Conference. The method turns copper roofs and other sheet copper work a beautiful green within a few hours, in contrast with the years required with the ordinary processes of nature. A chemical solution is sprayed onto the metal roof, and then, with the next fall of rain, the copper is green.

The development is considered to be highly important to the copper industry. Architects for years have been looking for some method of achieving the natural weathered effect in a short space of time. "The process is now out of the laboratory stage," Mr. Crane said, "and we have had very encouraging results with service tests on actual roofs. We cannot yet guarantee results or make many promises. We can say the treatment will not injure the copper, and we have one or two applications on roofs made six months ago which show no sign of deterioration on the coating."

The research chemists discovered after some study that natural patina is a basic sulphate. Prior to that it had been assumed it was a carbonate. This led to the development of a solution consisting mainly of ammonium sulphate. The coating formed by dipping copper into this solution was found to be identical in composition with natural patina. This led to the adaptation of the ammonium sulphate process to application as a spray, and that is the method used on roofs. The method is inexpensive and simple, though requiring a definite technique, it was stated. The chemicals used are readily obtainable and cheap.

Five or six spray applications are required, with drying allowed after each. The copper must be clean and must have weathered long enough for a brown tarnish to have developed on the surface. The patina does not appear immediately. If a heavy rain comes along too soon, it will probably spoil the work by washing off the salt before it has had an opportunity to act. After spraying there should first be an appreciable period of high humidity, or dew, or fog, so that the salt can absorb moisture and become active. After six hours or so of at least 80% humidity, the next rain will wash off the excess salt and bring out the blue-green color of patina. The color that develops at first is somewhat bluer than the natural patina, but on weathering the color approaches the natural shade.

Spray Booth Exhaust Systems

Safety Precautions in Construction and Operation*

PROPER removal of mist requires an adequate exhaust. In general, a velocity of 150 feet per minute or more, over the face of the opening is required to insure sufficient removal of the spray and fumes. Baffle or distributor plates on the inside of the booth are sometimes used for equalizing the air flow and preventing excess accumulation in exhaust ducts.

There are two types of spray booth exhaust systems in use; the direct exhaust, and the indirect exhaust. The direct exhaust employs an exhaust fan of either the propeller or blower type located either at the rear of booth or in the exhaust duct proper, so that in either case the fumes and spray must pass through the fan. In order to insure a proper exhaust, an adequate fresh air supply must be admitted to the room from the outside.

The indirect exhaust system, sometimes referred to as the injector type, is rapidly replacing the direct method. An exhaust fan of the blower type is located on the outside of the booth so that it discharges directly through an exhaust duct smaller in size than the larger main booth exhaust duct. This air movement in the main exhaust duct creates a partial vacuum in the duct and as a result, air rushes from the booth into this vacuum. No spray mist passes through the exhaust fan, and as a result there is no clogging or coating of the fan. This consequently lowers the fire hazard present when inflammable spray vapors are removed from the possibility of being ignited from friction, electricity, etc. The air supply inlet for the fan may open direct to the room or may be connected to a duct leading to the outside. The latter connection is preferable if a large number of booths are in operation in the same room.

The injector nozzle, in some designs, discharges into a cylindrical exhaust duct, while in others it discharges into a tapered duct, expanding in cross section above the point of injection, and narrowing down below this point.

Several spray painting precautions should be taken by the worker even though an efficient booth is provided. Employees engaged in spray painting should:

(a) Not spray at right angles to a flat surface, so causing the spray to roll back.
(b) Not spray too large objects and thus get out of range of the exhaust.
(c) Not spray promiscuously about the room in testing the sprayer.

Exhaust systems for dust removal must be designed so as to be adapted to the individual dust producing machines. The type and physical characteristics of the material to be exhausted must also be considered. In general, the following requisites for efficient dust exhaust systems may be said to be the most important.

1. Hoods, ducts, fans and collectors of adequate size.
2. Adequate air volume and velocities for removing materials.
3. Properly designed exhaust hoods which will not interfere with the operation of machinery.
4. Dust and fire hazards should be minimized.
5. Equipment designed so as to work with the lowest possible power consumption.

The following velocities are commonly employed in dust removal systems for specific materials:

Cotton, dry wood shavings and sawdust, and similar light dusts	2500-3000 ft. per min.
Wool, wet wood shavings, rags, waste, etc	3000-4000 ft. per min.
Lead dust, pulp chips, etc.	4000-6000 ft. per min.

Suction pressures required at exhaust hoods for usual proportioned connections:

Process	Static Suction in Inches of Water
Grinding and buffing wheels	2
Wood working machinery	2–4
Flint Grinding	2
Lead dust and fumes	2–4
Felt	2–3
Heavy materials	3–5

There are some processes in which the escape of fumes, dust, etc., cannot be entirely prevented, or these harmful materials cannot be efficiently removed. It is, therefore, necessary that the workers individually wear efficient protective equipment, such as:

1. Mechanical respirators using mechanical filters.
2. Chemical respirators using chemical absorbents.
3. Gas masks using chemicals in cannisters.
4. Hose masks or positive pressure helmets securing a fresh air supply from an outside source.

When mechanical respirators are used, the air of the workroom is drawn through a suitable material which filters out the solid particles. This gives ample protection against the inhalation of solid particles for a short time only, due to the filters becoming clogged, and thereby increases the resistance to air flow.

Chemical respirators will also act as a mechanical filter for solids with a varying degree of efficiency. Due to the fact that the absorbent material must be renewed every few hours, chemical respirators are effective, in general,, for short exposures only.

In gas masks, the air is drawn through chemicals contained in the cannisters, and it is very important to use the right kind of cannister and chemical for each particular case. The cannister must also be frequently replaced.

The hose mask or positive pressure helmet is the most satisfactory of all and is coming into greater use. The helmet or mask is made to fit over the wearer's face and fresh air is supplied through a hose from an outside source, in some instances a compressor line. A valve on the mask is so constructed as to permit the escape of air exhaled from the worker's lungs.

*From Safety for the Chemical Plant Worker. Journal of the Western Society of Engineers.

Measuring the Thickness of Electro-Plates

By FRED CARL

Guide Motor Lamp Company, Anderson, Indiana

The Microscopic Measurement of Copper and Nickel Plate Thickness on Steel, Brass and Zinc Base Die Castings

From the Monthly Review of the American Electro-Platers' Society, October, 1933.

SINCE the trend of modern industry calls for the standardization of plate thickness on each base metal, it was our purpose at the beginning of the investigation to develop a fairly rapid method for the measurement of plate thickness which could be applied as a control check on the thickness of the deposit. Heretofore the microscopic method of determining plate thickness has to a large degree, been considered of a research nature and not of sufficient speed to be classed as a control method. However, if this method as applied to copper and nickel plating could be placed in the routine or control type of work, certain advantages could be gained which would not be possible with the usual chemical method.

Especially is this desirable where there are three layers of plate, for example, nickel-copper-nickel on steel. In this instance a chemical analysis would be quite long and would require several separations, while if a rapid microscopic method were possible, this extra work could be eliminated, and the results would be obtainable in a reasonably short time.

As the investigation progressed, the methods used were extended to cover measurement of plate thickness on sheet brass and zinc base die castings. This paper then naturally is divided into three groups, as follows:

Copper and Nickel on Steel
Copper and Nickel on Brass
Copper and Nickel on Zinc Base Die Castings.

Copper and Nickel on Steel

In the case of plating on steel, the finished plated part (without the chrome plate) is first given a twenty to thirty minute plating in a copper cyanide bath using as high a current density as possible without producing "whiskers" on the part. Then the part is plated in an acid copper bath for approximately an hour, again using as high a current density as is possible. This can be done in a production lineup and need not require the services of a laboratory man. This plating should produce sufficient thickness of copper to protect the edges of the nickel plating and prevent rounding during the subsequent polishing. A specimen is then sawed out of the plated part and is ready to be set in a holder. For this purpose, two brass rings about one inch in diameter and about ⅜ inches wide are used. The specimen is placed inside the two brass rings, one ring placed on top of the other, and molten solder is poured into the rings and around the specimen. After the solder is cool, the two rings are sawed apart and either ring can now be used for the examination.

The polishing of the specimen is the next step in the preparation. Practically any good method of grinding and polishing metallographic specimens can be used. However, the following method has been found quite successful and fairly rapid, the grinding and polishing requiring about ten to fifteen minutes:

1. Grind on No. 80 Alundum paper.
2. Grind on wheel covered with canvas and using emery flour as an abrasive, grinding first across the plating and then with the plating.
3. Polish on wheel covered with Kersey cloth using No. 1 Levigated Alumina as an abrasive, polishing first across the plating and then with the plating.
4. Finish polish on wheel covered with Vel-Chamois cloth using No. 3 Levigated Alumina as an abrasive. The final polishing should be, as in the case of the rough polishing, first across the plating and then with the plating.

(The reason for always finishing with the plating rather than across it is to prevent smearing of the nickel into the copper.)

The specimen, after being washed with water is now ready to be etched.

The etching of the specimen in the case of plating on steel is divided into two classes, as follows:

1. Copper plating directly on steel
2. Nickel plating directly on steel

In the case where a copper plate has been applied directly to the steel, the etch used was the customary copper or brass etching reagent of the following composition:

N H_4OH—6 parts
H_2O_2 (3%)—1 part
} —by volume

However, where the nickel plate has been first applied to the steel, followed by alternate layers of copper and nickel, an etch must be used which will darken the steel, yet not affect the nickel layers. The following composition was found to give good results for this purpose:

HNO_3—5%
Alcohol—95%
} —by volume

If more contrast is desired between the steel and the plating an etch of the following composition has been found satisfactory:

Glycerine —3 parts
Conc HF —2 parts
Conc HNO_3—1 part
} —by volume

This acid etch must then be followed by the H_2O_2—NH_4OH etch in order to bring out the structure of the copper. In the case where the etching has been carried too far, either in the acid or the H_2O_2—NH_4

OH solution, the specimen must be re-polished, beginning with the canvas covered wheel using emery flour as an abrasive. In most cases, over-etching will be noticed as a broadening of the junction lines between the copper and nickel. This is caused by too prolonged etching with H_2O_2—NH_4OH solution. However, where a definite distinction between acid and cyanide copper is desired, a slight over-etching of the copper may have to be resorted to in order to bring about the desired results.

Copper and Nickel on Brass

The preparation of the specimen is essentially the same as in the case of plating on steel. However, due to the fact that the base metal is nearer the hardness of the solder used in the setting of the specimen, it is necessary only to apply a comparatively thin plate of external copper. Usually twenty to thirty minutes in a cyanide bath will give sufficient thickness to protect the edge and give contrast to the final nickel layer. The polishing of the specimen is the same as in the case of plating on steel, the time spent in polishing generally being somewhat shorter.

Since the base metal (brass) and the copper plating are both attacked by the usual NH_4OH—H_2O_2 solution, the etching of the specimen becomes quite simple. In the case of over-etching, the polishing should be repeated beginning with the canvas wheel and emery flour abrasive.

Copper and Nickel on Zinc Base Die Castings

The preparation for examination of this type of plated work is similar to that of plating on brass. Only a comparatively thin plate of cyanide copper is necessary to protect the edges and give contrast to the final nickel plate. Twenty to thirty minutes in a cyanide copper bath should give a sufficient layer of copper for this purpose. The polishing of the specimen is the same as was given under plating on steel.

The greatest difficulty in the examination of copper and nickel plating on zinc base die castings has been in the etching of the specimen. The usual NH_4OH—H_2O_2 solution applied with a cotton swab, as in the etching of plating on steel and brass, attacks the zinc base metal very rapidly and blurs the boundaries between the copper and the zinc base metal to the extent that an examination is practically impossible. Visual examination in the unetched condition was found fairly satisfactory, the only difficulty being that plate boundaries were not distinct. Several electrolytic etches were tried with varying degrees of success, the greatest difficulty with this type of etching being in the pitting produced over the surface and especially in the boundaries. The most successful etch found was in a polish-attack method using the usual NH_4OH—H_2O_2 as the etching solution. With this type of etching, a small quantity of the etching solution is poured on the final polishing wheel and using a slight pressure, the polished specimen is held against the wheel until the base metal (zinc) has darkened. This generally requires from three to five seconds for the etching. The specimen is then washed in water and alcohol and dried. Although this method sometimes requires repeated etching, the results obtained were superior to any other method.

Conclusion

Obviously there are disadvantages in this method of measuring plate thickness as well as advantages. First, it requires a metallurgical microscope with a range up to one thousand diameters, and polishing equipment. However, a large number of concerns already maintain a metallurgical laboratory where such instruments would be available and no additional expense would be incurred. Second, it must be borne in mind that only a small part of the piece is actually measured. However, chemical analyses of plated parts when checked against the microscopic method seldom vary over 0.0001" when the total thickness exceeds 0.0010". With decreasing amounts of plating the differences will be reduced to as low as 0.00002". Careful selection of the location on the plated part from which the specimen is to be cut is also essential in obtaining an accurate measurement. For example, where the piece is small and has sharp edges, the plate thickness may vary considerably from one spot to another. In this case it is well to take at least two measurements, one of the maximum and one of the minimum thickness and to average the results.

One of the greatest advantages in a practical way is the fact that a differentiation between the copper layers is possible, and also in plating where two or more nickel layers are used, a rapid measurement of the individual layers is made possible. This gives the production plater an idea which tank is giving the most efficient performance and he is able to adjust his plating time accordingly.

Another advantage is the one so ably presented by Dr. Watts. The quality of the preparation of the base metal can be easily determined and recommendations made to better the finished part. An examination of the quality of the buffing on the various plates is also possible.

It is not our intention to attempt to show that the microscopic method of determining plate thickness can be substituted for the chemical method, but merely to show that where speed is essential the microscopic method can be used to good advantage as a supplementary means.

I wish to express my thanks to D. A. Cotton, W. Castell, G. Cole, and A. Fletcher, all of the Process Department, Delco Remy Corporation, for their assistance during the investigation.

Dissolving Litharge Cement

Q.—I HAVE several glass compots which have metal bases and are set in litharge cement. What would be best to dissolve them apart without damage to the glass or the metal base? Please let me know as soon as possible.

A.—This cement will gradually soften and crumble if treated with acetic acid. Place the articles in a glass or china dish, and cover the cemented joints with full strength acetic acid (also called glacial acetic acid), and warm, possibly setting the dish inside a vessel of boiling water. If the cement is old and hard, it may take several hours to dissolve it. You can hasten matters by scraping off the softened cement with a knife.

You do not say what metal the bases are composed of. We assume that it is gold or silver or possibly rolled gold or brass. If so, acetic acid will do it no harm.

Acetic acid can be purchased at any chemical supply house, or probably from the nearest drugstore.

Jewelry Metallurgist.

Continuous Moulding Machine Aids Production

CAPABLE of producing 120 finished castings in eight hours, this foundry set-up at the Cleveland Works of the Westinghouse Electric and Manufacturing Company has proven its worth many times on large, special orders when time and production schedules were vital factors. The set-up consists essentially of a continuous conveyor in the form of an oval, an automatic moulding machine, a pneumatic vibrator and conveyors and equipment for conditioning the sand.

Fig. 1—Above—Automatic Moulding Machine and Layout at the Cleveland Westinghouse Works

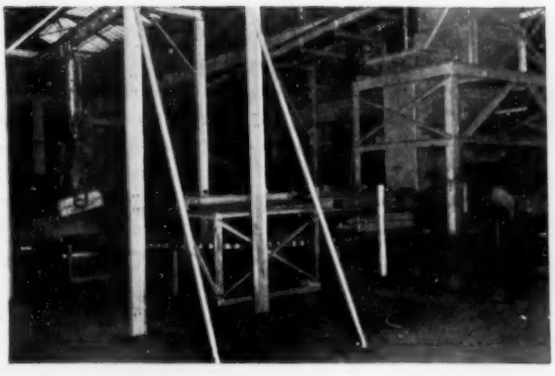
Fig. 2—Right—Pouring Moulds on the Continuous Moulding Machine. The Production of this Machine Is as High as 15 Finished Castings an Hour

Fig. 3—Below—View of Automatic Moulding Machine Showing Moulder in Operation at Right and Vibrator Shakeout for Removing Castings at Left

Twenty-five aluminum flasks travel through the moulding and casting cycles on this continuous conveyor. The flasks are 28" wide, 43" long and 6" cope and 6" drag. They are used for casting aluminum castings for streetlight units, cast iron range frames and doors, and cast iron bases for floor model ironers.

The moulding cycle is described by the following operations: An empty flask is brought to the moulding machine on the conveyor. The machine separates the cope and drag and inserts a match plate pattern. The flask is closed, turned over, filled and jolted. The bottom board is then clamped in place and the flask is again rolled over for filling and tamping the cope. The match plate pattern is then removed, the flask closed and the mould continues along the conveyor. All these operations are performed by the moulding machine, their sequence only being directed by the operator.

Two men pour the moulds as they progress along their route. Having cooled sufficiently before arriving at the shakeout platform, a pneumatic vibrator shakes out the casting and removes the moulding sand from the flask. The sand falls through a grate upon a belt conveyor and travels back to the conditioner for use again.



Nickel Silver Horn Castings

Q.—I AM making nickel silver saddle horns, and having trouble with them. The heads are breaking off. I am using pure sheet nickel silver, about 15 per cent nickel. We leave the horns in the molds until they are cold. I've used 6 oz. of 30 per cent manganese copper with pretty fair results to about 120 pounds. We would like to have these horns very strong as they are used for roping cattle.

A.—It is possible that what is causing the saddle horns to break is shrinkage. You do not state where they break. However, if it is in the neck the remedy is a large gate or riser.

We would also suggest that you try the following mixture: 96% German silver scrap; 3 lead; ½ manganese copper; ½ aluminum. Add the manganese copper with the German silver. When melted, add the lead. Stir well, and just before pouring add the aluminum as a deoxidizer.

We feel, however, that if you will experiment with your gating until you overcome the shrinkage, you will overcome your difficulty. We do not know the style of your horn casting, but we feel quite sure the trouble is in the neck.—**W. J. Reardon.**

EDITORIALS

The State of Trade

THIS is the time of the year when we watch business with more than usual concentration. A spring rise is expected. Is it here, or is it coming?

A summary of opinions and indices seems to show that it is approaching. The Brookmire Economic Service states that prospects for the steel industry are for an average rate of 45 per cent operation in 1934 against 34 per cent in 1933. Of course, there will be peaks and valleys due to seasonal fluctuations. According to Standard Statistics, deliveries of copper in the United States amounted to 389,000 tons in 1933 against 336,000 tons in 1932, an increase of about 16 per cent. Although the demand for copper from the public utility industry will be slow to recover, in view of the already ample plant capacity, the automobile, casting, wire and miscellaneous industries are expanding from 30 to 35 per cent this year. It is estimated that output in 1934 may be almost 20 per cent above 1933.

The New York Times Weekly Business Index continues to show gains, the figures for the week ending February 24th, being 84.5 against 82.2 for the previous week and 65.3 for the same time last year. This is the sixth or seventh consecutive weekly gain.

Reports from the plating industry show that the jobbing shops in the automobile manufacturing district are operating to full capacity and are short of skilled polishers. Business in other localities is not on the level with the middle west, but it is showing signs of spring improvement. Oneida community has added 600 workers in the past eight months. General Electric reports that orders received in January and February exceed those for the same months in 1933 by approximately 49 per cent.

Present indications are that we are convalescing. The convalescence is not rapid but we hope that it will be steady.

The Brass Foundry Industry

THE brass foundry industry as it is generally understood, includes all forms of casting non-ferrous metals. However, economic developments in recent years have separated from this classification, the die casting industry, which uses steel molds and machine methods of filling them. For the first time, largely through the efforts of the Non-Ferrous Foundry Association, we are getting a good idea of the size of the jobbing brass foundry business.

Recent estimates by Mr. Tour, executive-secretary of that Association, show that the industry has an invested capital of about $24,000,000, and a production capacity of about 36,000,000 pounds per month; a present rate of production of about 12,000,000 pounds per month; a present sales volume of about $2,600,000 a month and about 9300 employees at this time. The above figures do not include die castings, railway car brass castings, castings produced for owned or affiliated companies, and castings produced under other codes such as valves and fittings, plumbers' brass goods, ornamental bronzes, bells, cast aluminum cooking utensils, etc.

It is noteworthy that the monthly production per man has fallen from 2300 pounds to about 1250 pounds, partly through the effort to spread the work among a larger number of employees and partly through the loss in efficiency due to this type of operation.

The brass foundry industry consumes metals in about the following proportions: Copper, 60%; Aluminum, 24%; Zinc, 8%; Tin, 4%; Lead, 4%.

The industry was injured not only by the falling off in business, shown by the figures above, but by a drop in prices and in the differentials between prices obtained and the cost of raw materials. In 1930 the differential between the sales price per pound of castings and raw metal costs was 17.25 cents; in 1931, it was 17 cents; in 1932, 15.75 cents; to-day it is about 7.5 cents per pound. This trend is undoubtedly the result of the merciless competition which has existed.

Under its new code, the brass foundry industry is raising its minimum wages from an average of about 20 cents to 35 cents per hour in the northern district and from as low as 10 cents to 30 cents in the southern district. The average minimum wage throughout the entire industry dropped as low as 20 cents in 1932, thus being raised almost 100 per cent under the code. Obviously the industry is doing its part.

The brass foundry is making a brave effort to resume its place in American industry. It is faced by competition from forgings, pressed steel parts, welded products, malleable iron, gray iron, steel castings, stampings, die castings, and recently, composition molded products. It needs the undivided effort and loyalty of everyone engaged in it.

The Extent of the Plating Industry

HOW large is the electroplating industry? How many shops are there? How many men are engaged in the industry? What is the dollar value of the work done? These are questions that have been asked again and again with no answer worthy of the name.

Within the last year, however, we have been able to obtain some figures through the Master Electroplaters' Institute, which, together with the Census reports give us a better idea of the extent of the plating industry.

There are about 1200 shops in the United States which specialize on job plating. These shops employ about 10,000 people when running to capacity. (At the present time they are probably running at not over 60 per cent). Their output in normal times would be about $30,000,000 per year with a total capital investment of from $10,000,000-$12,000,000.

The job plating shops comprise only a small part, however, of the total plating industry. There are perhaps 4,800 plating plants which are departments of manufacturing companies making an immense variety of products. The figures for their output are not segregated by the census as they are scattered throughout dozens of industries and their output is included in those different classifications. How much work do they do?

We have one guide—the Census figures for buffing and polishing wheels. In 1929 about $4,500,000 worth of wheels were made. Roughly, polishing wheels comprise about 12 per cent of the total plating shop expenses for materials, and materials are about 12 per cent of the total plating shop costs. Hence, the output of the entire plating industry including job shops could be estimated for 1929 at from $250,000,000 to $300,000,000. Subtracting from this total the figures for jobbing shops alone, we have an estimated capacity of about $250,000,000 for the plating departments of manufacturing plants.

The emphasis should be not so much on the detailed figures as on the general aspect. These statistics show that plating is a large industry, even though it includes such a large number of very small shops. It is secondary in character. It sells a service and not a commodity. It serves industry directly and the general public only indirectly. But it is a good sized industry and indispensable for the protection which it affords metal products and the decorative effect and attractiveness which it adds to these products. Plating is one of the most important means of "saving the surface to save all", and plating is probably the leading "finish which makes the sale".

What is Under the Electro-Plate?

IT has always been the custom in the past, in the manufacturing plant to "hang it on the plater". If the plate peels, blame the plater. If a plate wears off too quickly, blame the plater. If the work is spotty, blame the plater.

Sometimes this blame is justified, but far from always. There is another question which is assuming growing importance as it gains recognition. What is under the plate? What is the condition of the base metal?

An interesting discussion of this question was given by George B. Hogaboom of the Hanson-Van Winkle-Munning Company, at a recent meeting of the Chicago Branch of the American Electroplaters' Society. He pointed out that metallurgy will some day bring to bear its influence on the condition of the work before it goes to the plater. He cited many instances where the bad appearance or the failure of a deposit was directly traceable to operations performed on the work before it had reached the plating room.

This opens up a field so large that it calls for long and careful consideration. No one doubts the influence of the base metal on the electroplated coating. We have before us always our annual trouble, spotting out, as a proof of this fact. We must, however, give full weight to the effect of the base metal, as plating in many places and at many times suffers from unfair blame. Comparisons are now being drawn between the lacquer and enamel finishes and the plated finishes on automobiles. It has been stated that the lacquer and enamel finishes give longer life. No less an authority than William Phillips of the General Motors Corporation advises that plating be improved steadily in order to keep from being eliminated from use on automobiles.

The subject is enormous in extent, but its importance is so great and so fundamental to the well-being of the industry, that it should be undertaken systematically at the earliest feasible time.

We Still Have Artisans

THE silverware industry has the honor of being unique in this day of skilled machinery and unskilled help. Silver still requires the work of a large number of skilled artisans. To be sure machinery has made inroads. Fine work can be turned out by stamping and rolling. But rolling still requires skilled men, die making requires skilled die sinkers and hand burnishing calls for years of experience and training.

Some interesting facts were recently brought out by E. C. Mayo, president of the Gorham Manufacturing Company of Providence, at a hearing on the N. R. A. code for the silverware industry. He stated that a survey of one large plant showed that the average age of the silversmiths employed was 53 years, and that the die sinkers averaged 57 years of age. More than 60 per cent of all the skilled workers in one large plant had been continuously employed by that company for more than 25 years. Silverware, Mr. Mayo pointed out, was formerly all hand wrought, but even now the industry is not highly mechanized. One skilled craftsman is required for each additional worker employed.

We must remember also not to overlook our hundreds of silverware repair shops. Here the old-fashioned craftsmen and metal workers still hold their place in large numbers.

We still have artisans, and what is more, we hope to keep them.

New Books

Die Galvanotechnik (Electrodeposition) by Gerhard Elssner. Published by Akademische Verlagsgesllschaft, Leipzig, Germany. 1933 (448 pages). (Price at present exchange about $10.00).

This book forms part 3 of the first volume of a "Handbook of Electrochemistry", edited by Victor Engelhardt. The book is more scientific than most of the other books on plating that have been written in English or German. Its greatest value will be to one engaged in research for it contains over 500 references to papers on deposition, including many American authors. These references are especially complete on methods of measuring throwing power, and the hardness, adherence and protective value of plated coatings.

The book also contains descriptions and illustrations of apparatus used in cleaning and plating. This section gives a good opportunity to compare the mechanical progress in Germany and America.

The author has succeeded in his effort to bring to persons engaged in electrodeposition a complete, critical, concise summary of the scientific principles and developments in this field. **W. Blum.** Monthly Review of the American Electro-Platers Society.

Directory of New York State Manufacturers for 1932. Volume 2 covering the Metropolitan area including New York City, Long Island, Rockland County and Westchester County. Size 8" x 11½", paper bound, 499 pages. Price $5.00, obtainable from William J. Picard, Deputy Industrial Commissioner, New York State Department of Labor, 80 Centre Street, New York.

This volume covers over 33,000 factories, 840 power laundries and dry cleaning establishments and 5,280 automobile service and repair shops. The Directory has been assembled from 1932 records of the New York State Department of Labor, checked by other available sources of information. It is divided into two registers, one an alphabetical list of all firms and the other a classified list including 198 industry groups.

The information given includes the addresses, principal products and some indication of the size, by a code letter, of each firm.

The Alfred David Lenz System of Lost Wax Casting. Published by the National Sculpture Society, 115 East 40th Street, New York City.

Alfred David Lenz was known in professional circles as the master of the art of casting fine statuettes, reproducing detail to a degree of perfection which no one else was able to duplicate. He exhibited, from time to time, castings of flowers and lace and also a series of statuettes, most of them not over eight inches high, which were cast, not only in one, but in four or five metals.

He made a careful record of his experiments and the conclusions at which he arrived. At his death in 1926 these were left to his brother and two sisters who deeded the process to the American Artists Professional League. This League in turn turned the process over to the American Sculpture Society, under whose direction a booklet was published with the title given above.

The basis of this process is the ancient art of **cire perdu** (lost wax) casting. It is in its refinements and in the mixing of the waxes that the Lenz process excels.

Copies of the book can be obtained from the National Sculpture Society.

Practical Microscopical Metallography by Richard H. Greaves and Harold Wrighton. Published by D. Van Nostrand Company. Size 6 x 9½; 256 pages. Price $6.00.

This is the second edition of the work of two members of the Research Department, Woolwich, England, including a new chapter on low power photomicrography and macrography. The authors have kept in mind the needs of students of metallurgy and engineering in considering the strength and properties of engineering materials. They give a full description of the technique of microscopical examination and the methods of overcoming the practical difficulties in the laboratory.

Book Notes

Electric Power Costs in the Foundry. A report of the conference on electric power costs presented at the annual convention of the American Foundrymen's Association in Chicago, June, 1933. Published by that Association, 222 West Adams Street, Chicago, Ill. Price $1.

Handbuch der Technischen Elektrochemie by Dr. Victor Engelhardt. Published by Akademische Verlagsgesellschaft m.b.H., Leipzig, Germany. Price 32 marks.

Handbook of Chemistry and Physics. Published by the Chemical Rubber Company, Cleveland, Ohio. 1524 pages. Price $3 to $6 depending upon binding.

American Standards Yearbook. Published by the American Standard Association, 29 W. 39 St., New York,

Raw Commodity Prices in Relation to General Business Conditions, by Dr. M. T. Copeland. Published by Harvard Business School, Soldiers Field, Boston, Mass. Price $1.

Manual on the Presentation of Data. Published by the American Society for Testing Materials, 1315 Spruce Street, Philadelphia, Pa. 45 pages. Price 50c.

Journal of the Institute of Metals. Volume L. "Metallurgical Abstracts". 1932. Pp. 962. Cloth. Edited by G. Shaw Scott, M.Sc., Published by the Institute of Metals, 36 Victoria Street, Westminster, S. W. 1. London, England. Price £4, inclusive of two Proceedings volumes.

Journal of the Institute of Metals. Volume LI. "Proceedings". Pp. 363. 27 plates. Cloth. Edited by G. Shaw Scott. Published by The Institute of Metals, 36 Victoria Street, Westminster S.W.1. London, England. Price 31s.6d.

Industrial Research Laboratories of the United States, Including Consulting Research Laboratories. By C. J. West and C. Hull. Published by the National Research Council, Washington, D. C. Price $2.

Mineral Resources of the United States, 1930. Part 1 on Metals. By O. E. Kiessling, U. S. Bureau of Mines. Obtainable from the Superintendent of Documents, Washington, D. C. Price $1.50.

Special Steels by Sir Robert Hadfield and T. H. Burnham. Published by Isaac Pitman & Sons, New York. Price $3.

Chemical Guide Book. 1933 (ninth) Edition. Published by Chemical Markets, Inc., New York. A catalog of the leading chemical firms in the United States; a buying guide and directory; a geographical directory; a buyers' guide on containers, packing and shipping supplies; and chemical statistics. Price $2.

Mechanical World Year Book for 1934. Published by Emmott & Company, Ltd., 31 King Street West, Manchester, England. Annual publication on British machine shop practice. It includes, this year, a section metals and alloys. Price 1s.6d net.

Shop Problems

This Department Will Answer Questions Relating to Shop Practice.

ASSOCIATE EDITORS

Metallurgical, Foundry, Rolling Mill, Mechanical

H. M. ST. JOHN
W. J. REARDON
W. J. PETTIS
W. B. FRANCIS

Electroplating, Polishing, and Metal Finishing

O. J. SIZELOVE
G. B. HOGABOOM
A. K. GRAHAM, Ph.D.
WALTER FRAINE

Knives Peel

Q.—What can we do about keeping steel blades of table knives from peeling after plating? All hard and soft metal that we plate comes out perfect, but in plating steel blades we find that a certain percentage of them blister.

A.—We are inclined to believe that your trouble will be found in the steel strike solution. We are unable to tell you how to correct the trouble without making an analysis of the solution. Send us a sample of the solution for analysis and tell us the volume of solution being used, and we will try to help you with your trouble.

O. J. S., Problem 5,272.

Nickel on Scissors

Q.—We are sending sample of our electro-cleaning, nickel and cyanide copper solutions.

We have been having considerable trouble in our nickel plating, and thought first that our trouble was in our cleaner tank. Today we plated a quantity of material and did not give it a copper flash, and the nickel came out good, and we did not have any trouble with peeling. The trouble we have been having is that the backs of shear blades peel while polishing the inside surfaces of the blade, which is always done after they are nickel plated for the reason that we cannot have any nickel deposit on this particular surface of the shear.

Our shears are put in the cleaner tank, then rinsed in hot water, then put into a muriatic acid of approximately 50% solution of 18° acid. Then they are rinsed in two cold water tanks and are put in the cyanide copper solution for approximately one-half minute. Next they are rinsed in two water tanks, and then hung in the nickel solution.

A.—Analysis of nickel solution:

Metallic nickel	2.95 oz.
Chlorides	3.33 oz.
pH	5.4

The metal and chloride contents are satisfactory, but the pH is too low. To correct the pH add 12 fluid ounces of 26° ammonia to the solution. We would suggest that the temperature of the solution be watched, for when the temperature gets too low a brittle deposit is produced.

Analysis of cyanide copper solution:

Metallic copper	0.98 oz.
Free cyanide	0.38 oz.

For a strike solution the free cyanide content is too low. We

USE THIS BLANK FOR SOLUTION ANALYSIS INFORMATION

Fill in all items if possible.

Date.....

Name and address: .....Employed by: .....

Kind of solution: .....Volume used: .....

Tank length: .....width: .....Solution depth: .....

Anode surface, sq. ft.:.....Cathode surface, sq. ft: .....

Distance between anode and cathode: .....Kind of anodes: .....

Class of work being plated: .....Original formula of solution:.....

REMARKS: Describe trouble completely. Give cleaning methods employed. Send small sample of work showing defect if possible

Use separate sheet if necessary. _____

_____

_____

_____

NOTE: Before taking sample of solution, bring it to proper operating level with water; stir thoroughly; take sample in 2 or 3 oz. clean bottle; label bottle with name of solution and name of sender. PACK IT PROPERLY and mail to METAL INDUSTRY. 116 John Street, New York City.

would suggest that you add 36 ounces of sodium cyanide to this solution. Operate this solution at 120° F.

We also recommend that a cyanide dip be used after the muriatic acid pickle, preparatory to copper plating. Cyanide dip to be made by using 6 ounces of sodium cyanide to each gallon of water.

O. J. S., Problem 5,273.

Plating Data

Q.—What is the best kind of plating to put on seamless brass tubing to withstand heat? Must have a chromium finish. We have been nickel plating, then chromium, but when the pipe gets hot this plate does not stand up very long. What do you recommend?

What is the object of wrapping nickel anodes before placing in tanks? Is there any advantage in this?

What are the best methods of determining thickness of nickel or copper deposits?

A.—We can see no reason why the brass tubing, if properly nickel and chromium plated, will not answer for your purpose in finishing the automobile accessories illustrated in the pamphlet enclosed with your inquiry. We suggest that the work be nickel plated in a solution based on the following formula:

Double nickel salts	8 oz.
Single nickel salts	8 oz.
Sodium chloride	3 oz.
Boric acid	3 oz.
Water	1 gallon

Adjust the pH to 5.8 or 6; operate the solution at a temperature of 110° to 120° F., using a cathode current density of 15 to 20 amperes per sq. ft.

The deposit should be 0.001 inch thick, and the work should be nickel colored and chromium plated for 10 to 15 minutes.

Nickel anodes are bagged to prevent sludge and small particles of the nickel anode from entering the solution to cause a rough deposit.

There are three methods that may be used to determine the thickness of deposited metals. A chemical analysis; the use of a micrometer; or by microscopic measurements. The micrometer method is generally used, due to the ease and rapidity with which the measurements can be made.

O. J. S., Problem 5,274.

Pores Cause Spots

Q.—In plating our casket hardware we find there is a tendency for the cyanide or cleaner to work out after the parts have been plated for a few days. We are plating with copper, silver, and nickel. The lacquer discolors and shows spots so much that we have to plate the work over.

After plating we have been dipping the castings for about 20 minutes in a solution of sulphuric acid and water, to neutralize the cyanide in the pores. The castings are made of antimonial lead.

Is there any other process that will stop this spotting?

What cleaner would you suggest to keep the lead from oxidizing? We are using trisodium, but it will oxidize slightly and affect the plate even though we brush it by hand before going to the plating tank.

A.—The trouble you are having with "spotting out" is due to the porosity of the castings. To eliminate the trouble we would suggest that you watch the casting operation, and see that the metal is clean when poured. After plating and thoroughly rinsing in alternate hot and cold water and then drying, place the work in an oven where a temperature of 350° to 400° F. can be maintained for 18 to 24 hours.

Any cleaner that is strongly alkaline will tarnish the lead alloy if the work is allowed to remain in the cleaner too long. There are cleaners on the market that can be used successfully on your class of work, and we suggest that you consult the "Buyer's Guide" of the **Metal Industry** for this cleaner, or get in touch with makers of prepared cleaners.

O. J. S., Problem 5,275.

Refinishing Automobile Accessories

Q.—We do a great deal of chromium plating on iron and steel automobile parts. This work, when finished, looks nice, but after a short time begins to show a very red dust. Below we are outlining just what we do, and would like to have you criticize our methods.

Automobile bumper: we strip the old plating from it, polish well, copper plate, buff three times. We use a cyanide copper plating bath. We then give it one hour of nickel plating, buffing the nickel, which makes a very good nickel plating job. We then chromium plate the bumper. As above stated, we get a very good looking job.

We realize that steel bumpers will rust in time, but we are sure that our plating does not stand up as long as it should.

A.—We believe that your trouble is due more to the polishing operations than the plating operations. After stripping the work, the rust or pit marks should be removed by polishing operations. Sometimes it is necessary to use a stone or No. 46 emery wheel to remove these pits. If the pit marks are not all removed, it will not take very long for them to show rust marks after refinishing.

The general plating procedure is to plate in nickel solution for ½ hour, plate in acid copper solution for 1 hour, then copper color, plate in nickel for 1 hour, then nickel color, and then chromium plate. In using this procedure, if the solutions are in good operating condition, a first class job should be obtained.

O. J. S., Problem 5,276.

Silver Peeled

Q.—We enclose herewith a plated knife and would deeply appreciate your opinion as to whether, in your estimation, the silver on this knife is peeling off, or the worn part is due to rough handling, cleaning, etc.

A.—The deposit of silver on the knife has peeled in the steel ball burnishing process, due to faulty plating.

In silver plating steel knives we advise the use of a special silver strike solution previous to the regular silver strike solution. This special silver strike solution is prepared from the following chemicals:

Silver cyanide	¼ oz.
Copper cyanide	2 oz.
Sodium cyanide	10 oz.
Sodium carbonate	2 oz.
Water	1 gallon

O. J. S., Problem 5,277.

Silver Plating

Q.—We have a brass filter head about 24" wide, 12" deep, weighing about two hundred pounds. This piece was silver plated. We are to strip and resilver it with an extra heavy durable job of silver plating in a brush finish on the inside. The outside is painted.

It is too big to put in our tank, so we were thinking of making a tank out of the casting. How would you do it?

A.—The filter head which you wish to silver plate can be used to hold the solution while plating.

The old silver deposit can be removed by using a sodium cyanide solution (6 to 8 ozs. sodium cyanide to each gallon of water) with the reverse current.

After stripping, the surface should be polished to remove any roughness caused by the stripping operation. It should then be thoroughly cleaned, and nickel plated for 5 to 10 minutes. Rinse thoroughly, silver strike by using the regular silver strike solution; then silver plate; and finally wet scratch-brush.

If a little care is taken in cleaning and rinsing between the plating operations, you should have no trouble in silver plating this piece of work.

O. J. S., Problem 5,278.

Patents

A Review of Current United States Patents of Interest

Printed copies of patents can be obtained for 10 cents each from the Commissioner of Patents, Washington, D. C.

1,928,949. October 3, 1933. **Electro-Plating Apparatus.** William J. O'Neill, River Forest, Ill., assignor to Mercil Plating Equipment Company, Chicago, Ill.

1,928,950. October 3, 1933. **Tumbling Barrel or the Like.** William J. O'Neill, River Forest, Ill., assignor to Mercil Plating Equipment Company, Chicago, Ill.

1,929,486. October 10, 1933. **Dyeing Oxidized Aluminum.** Leon W. Eberlin, Rochester, N. Y.

1,929,559. October 10, 1933. **Process of Coating and Product Thereof.** William H. Moss, Cumberland, Md.

1,929,895. October 10, 1933. **Soldering Flux.** Frank D. McBride, Philadelphia, Pa.

1,930,119. October 10, 1933. **Dental Alloy for Cast Dentures.** Robert Ross Bayes, London, England.

1,930,195. October 10, 1933. **Electrolytic Aluminum Reduction.** Konrad Eigenheer, Sierre, Switzerland.

1,930,287. October 10, 1933. **Method of Compressing Powdered Materials.** Charles R. Short, Detroit, Mich., and Craig V. Morton, Dayton, Ohio.

1,930,323. October 10, 1933. **Crucible Furnace.** Furman South, Jr., Pittsburgh, and Oscar E. Neuhausen, Zelienople, Pa.

1,930,331. October 10, 1933. **Metal Surface Finish.** Ford C. Zimmer, Fort Wayne, Ind.

1,930,341. October 10, 1933. **Zinc Base Die Casting Alloy.** John R. Freeman, Jr., Waterbury, Conn.

1,930,373. October 10, 1933. **Metal Spray Gun.** Ernest Stubenrauch, Cleveland, Ohio.

1,930,463. October 17, 1933. **Hardening of Aluminum.** Robert S. Archer, Milwaukee, Wis.

1,930,601. October 17, 1933. **Metal Coating Apparatus.** Frank P. Townsend, East Orange, N. J.

1,930,683. October 17, 1933. **Polishing Machine for Colored Pulverulent Bronze.** Erwin Kramer, Berlin, Germany.

1,930,684. October 17, 1933. **Method of Manufacturing Bronze Colors.** Erwin Kramer, Berlin, Germany.

1,930,702. October 17, 1933. **Tube Mill.** William R. Webster, Bridgeport, Conn.

1,930,826. October 17, 1933. **Process for Reproducing the Surface of Plates.** Howard B. Scott and Charles C. Conley, Dayton, Ohio.

1,930,877. October 17, 1933. **Apparatus for the Electrolytic Manufacture of Metals, and Chiefly of Magnesium.** Alfred Claude Jessup, Clamart, France.

1,930,956. October 17, 1933. **Acid Resisting Alloy.** Reginald Hazeltine, Chicopee Falls, Mass.

Do Our Readers Want Patent Information?

A QUESTION has arisen as to the advisability of our continuing to publish patent abstracts in every issue of our journal. The number of patents being granted in the metal and metal finishing industries has grown very large in recent years. It is practically impossible to distinguish between the patents which have commercial possibilities and those which are likely to fall by the wayside. Inevitably the publication of all patents in our industries must include a large proportion of "chaff".

For that reason we ask our readers to advise us on the questionnaire below whether or not they wish us to continue to publish abstracts as we have been doing for many years. Please check one of the questions below and return the slip to **Metal Industry,** 116 John Street, New York.

1. We make use of your patent abstract page and would like to have it continued.

2. We are not interested in your patent abstract page.

1,930,990. October 17, 1933. **Process for Making Japanned Metallic Tiles.** Sotojiro Asobe, Kanazawa-Shi, Japan.

1,931,001. October 17, 1933. **Process and Apparatus for Producing Continuous Zinc Wire.** Leaman S. Harvey and Howard P. Hart, Waterbury, Conn.

1,931,134. October 17, 1933. **Bright Annealing.** Augustus B. Kinzel, Beechhurst, Long Island.

1,931,285. October 17, 1933. **Process of Treating Drosses.** Frank F. Colcord, New York, N. Y., and John J. Mulligan, East Chicago, Ind.

1,931,489. October 24, 1933. **Die Casting Machine.** William J. During, Syracuse, N. Y.

1,931,500. October 24, 1933. **Buffing or Polishing Machine.** Francis W. Lovett, Hatfield, Mass.

1,931,587. October 24, 1933. **Casting Metals in Metal Molds or Dies.** Frederic Whigham McConnel, Barbers, Martley, England.

1,931,704. October 24, 1933. **Process of Protecting Ferrous Metals.** Stanley C. Moore and Frank E. Bowker, Toledo, Ohio.

1,931,769. October 24, 1933. **Casting Apparatus.** William G. Newton, Hamden, Conn.

1,931,854. October 24, 1933. **Addition Agent.** Roscoe Teats, Denver, Colo., and Rudolph Leonard Hasche, Milwaukee, Wis.

1,931,907. October 24, 1933. **Die Casting Machine for Motor Pistons.** Victor H. Tandy, Lynwood, Calif.

1,931,912. October 24, 1933. **Method of Forming Aluminum.** Raymond T. Whitzel, Massena, N. Y.

1,931,913. October 24, 1933. **Method of Metal Working.** William T. Ennor, Massena, N. Y.

1,932,156. October 24, 1933. **Process of Coating.** Albert Jean Ducamp and Marie Emile Alfred Baule, Paris, France.

1,932,354. October 24, 1933. **Melting Furnace and Method of Constructing and Operating Same.** Alfred W. Scheidt, Sewaren, N. J.

1,932,355. October 24, 1933. **Melting Furnace with Secondary Heating Features.** Alfred W. Scheidt, Sewaren, N. J.

1,932,454. October 31, 1933. **Metal Drawing.** Russell Franks, Jackson Heights, N. Y.

1,932,553. October 31, 1933. **Cleaning and Preservation of Metallic Surfaces.** George L. Magoun, Nitro, W. Va.

1,932,699. October 31, 1933. **Process for Applying a Protective Coating to Metallic Articles.** Heinrich Klas, Dusseldorf, Germany.

1,932,713. October 31, 1933. **Preparing Metal Surfaces for Coating with Metals and Metal Alloys.** Francis H. Snyder, Niagara Falls, N. Y., and Stanley F. M. Maclaren, Niagara Falls.

1,932,741. October 31, 1933. **Method of Manufacturing Disintegrated Bronze Foils.** Erwin Kramer, Berlin, Germany.

1,932,795. October 31, 1933. **Corrosion Resistant Aluminum Alloy.** William E. McCullough, Detroit, Mich.

1,932,823. October 31, 1933. **Apparatus for Pressure Die-Casting.** John E. Hoy, Midland, Mich.

1,932,834; 1,932,836-7; 1,932,854; 1,932,-872. October 31, 1933. **Aluminum Alloys.** Robert T. Wood, Lakewood, Ohio.

1,932,835. October 31, 1933. **Aluminum Alloys.** Ludwig J. Weber, New Kensington, Pa.

1,932,838; 1,932,853; 1,932,873. October 31, 1933. **Aluminum Alloys.** Walter A. Dean and Louis W. Kempf, Cleveland, Ohio.

1,933,136. October 31, 1933. **Tinning Machine.** Claude A. Bollinger, Gary, Ind., and John P. Rodgers, Martins Ferry, Ohio.

1,933,201. October 31, 1933. **Turning Machine.** George F. Yager, Toledo, Ohio.

Equipment

New and Useful Devices, Metals, Machinery and Supplies

New Low-Price Controllers for Temperature, Pressure

Two new control instruments have been developed by the Foxboro Company, Foxboro, Mass. Their appearance is practically identical, but one controls temperature and the other pressure. These two controllers are recommended where dependable control at a definite control point must be had inexpensively.

The dial and knob on the lower face of the controller permits adjustment of temperature or pressure within the

New Foxboro Controller

range of the instrument. The indicating gauge above the adjusting knob shows the air pressure on the diaphragm motor of the control valve and also shows whether the valve is opening or closing. On the temperature controller, a two-inch dial type thermometer may be installed in place of the air gauge. This thermometer is connected to the same bulb as the controller, thus showing the temperature being maintained. The pressure controller may be equipped likewise with a high pressure indicating gauge that shows the pressure being controlled. In either case, it is necessary to mount a valve motor air gauge on the air line to the valve outside the case.

These controllers have a universal case that can be either flush or surface mounted. Connection may be either top, bottom or back, and choice can be made when instrument is being set up.

All working parts are integral with or mounted on a cast aluminum base. By removing a few screws the entire case can be removed, leaving interior open to inspection.

Foxboro Company designates the temperature controller as Type 1119, and the pressure controller as Type 2119.

Straightener Feeds Coil Stock to Presses

The Waterbury Farrel Foundry and Machine Company, Waterbury, Conn., has developed a new roll feeding straightener. This machine makes it possible to use coil stock which is cheaper than flattened strip cut to length. By removing the drag of the coil from the roll feed more accurate feeding can be obtained, reducing the possibility of cutting half blanks and damaging the tools. By using coils to produce flat blanks, strip stock can be eliminated, with resulting economy of operation as the operator can attend to more than one press at a time.

A circular shows this straightener taking metal from a 200-pound coil, flattening and delivering it to a special horizontal two-post blanking press. The straightener is recommended by the manufacturers for use with roll feed and hand feed pillar and open back presses; also double action, transfer, cut and carry and follow tool presses. It is made in three sizes: No. 1 Stationary, (maximum thickness 3/64" by 4" wide); No. 2 Stationary, (1/16" x 8" wide); No. 3 Portable, (1/10" x 12" wide).

Latest Products

Each month the new products or services announced by companies in the metal and finishing equipment, supply and allied lines will be given brief mention here. More extended notices may appear later on any or all of these. In the meantime, complete data can be obtained from the companies mentioned.

Internal Grinder. Precision machine in ½, 1, 2 and 3 H.P. sizes; adaptable for use with lathe and boring mill; job or production work; constant speed motors; use ordinary vitrified wheels. Hisey-Wolf Machine Company, Cincinnati, Ohio.

Explosion-Proof Motors. Single-phase, capacitor type; self-contained; for use in fire-hazardous locations. Louis Allis Company, Milwaukee, Wis.

Metallic Lead Packing. "Bestolife" plastic mixture of asbestos, cotton and metallic lead; offered for pump and valve glands subject to severe conditions, as in chemical service. Armite Laboratories, 1900 East 65th Street, Los Angeles, Calif.

Motor. New type featuring self-protection against overload and burning by means of authentic power shut-off; A.C., induction; ½ to 30 H. P. Lincoln Electric Company, Cleveland, Ohio.

New Variable Speed Pulley for Wheel Speed Control

Hammond Machinery Builders, Kalamazoo, Michigan, announce the new Hammond variable speed pulley designed to give a means of maintaining periphery speeds on grinding, polishing and buffing wheels. The pulley is compact and incorporates the multi-V belt. Changes in speed are effected by expanding or contracting the diameter of the pulley. The segments engage at their inner ends with a scroll thread. Any speed within the range of the pulley may be had; the range of speed is 50% greater than the low speed. A Vernier dial on the pulley indicates operating speed. Changing from one speed to another is stated to be very simple, requiring about one minute. The pulley is nine inches in diameter, fully expanded. The width varies with the number of V-belt grooves used, which are determined by the driving horse power.

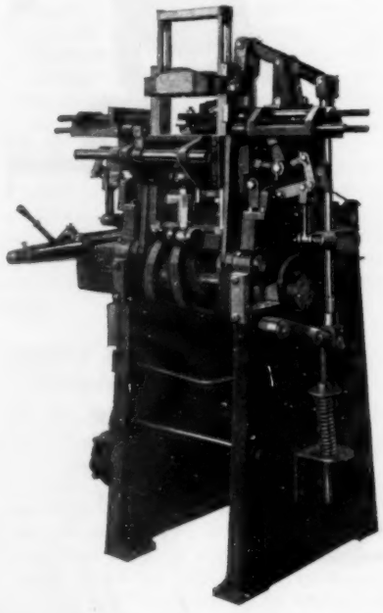
This pulling is very adaptable to Hammond line of polishing and buffing lathes and is also recommended for any machine where a quick change of speed is desired. The weight of the pulley is 58 pounds.

Hammond Variable Speed Pulley

Kux-Lohner Automatic Die Casting Machines

The Kux-Lohner Machine Company, 2145 Lexington St., Chicago, Illinois, has evolved an entirely automatic high speed die casting machine, a complete self contained unit, requiring only one operator.

The Kux Hi-Speed automatic die



"Hi-Speed" Die Caster

casting machine provides for a variable plunger pressure (for all zinc, lead and tin alloys), the same being adjustable within five minutes of time to any desired working pressure for 500 to 2,000 pounds per square inch. Special goose neck pots are supplied for the casting of aluminum alloys, which of course require air pressure.

A feature is the patented die squeezing device, which subjects the closed die to an extra pressure, at the moment of injection of metal. During this interval all power driven mechanism is at complete rest, remaining so while the casting is cooling under pressure. Cores may be pulled mechanically or hydraulically, from the usual four sides of the die. There are push and knockout pin mechanisms on both upper and lower die holders.

Accessibility of the open die to operator is effected by a special automatic stop mechanism stopping the die holder at the open position of dies, all of which is at a convenient angle to operator for removing casting, placement of insert and cleaning and inspection of die before the next shot. A hand-lever-controlled clutch permits intermittent operation when desired.

The machines are of the vertical type, effecting a considerable saving in floor space. An automatic metal feeder, permits the molten metal to be held at an uniform level in the pot.

All adjustments are in view and within easy reach of the operator. Any part of the unit may be set when the machine is hot. Even the pot may be adjusted.

A wide range of machines is provided in the four models viz:

A—Casting speeds 5—7½—11—15 shots per minute; accommodates dies 9½" x 7" x 6" thick; floor space 4' x 4'.

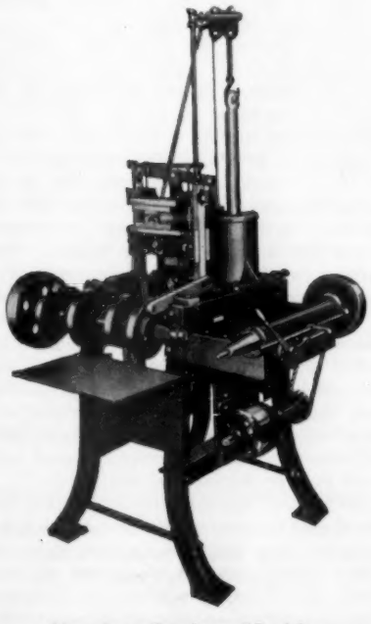
B—Casting speeds 5—7½—11—15 shots per minute; accommodates dies 13½" x 9" x 6" thick; floor space 4½' x 4½'.

C—Casting speeds 1½—2¼—3—4½; accommodates dies 18" x 12" x 9" thick; floor space 6' x 6'.

D—Casting speeds ¾—1¼—2 shots per minute; accommodates dies 36" x 24" x 20" thick; floor space 6' x 10'.

Novelty Casting Machines

The Kux Hi-Speed Novelty Casting Machine has been developed by the Kux-Lohner Machine Company to cover the low priced field for the rapid casting of small parts, toys, "brilliant sets" and other novelties from zinc, lead and tin base alloys. This machine is adaptable not only to the job and small manufacturing plant, but also for the larger



Novelty Casting Machine

manufacturer with diversified lines. The machine made in several types, either hand or motor driven. Model is for small parts; Model T is for larger sized work, and includes several of the automatic features of large die casting equipment described above. Metal pots are equipped with an automatic metal feeder, by means of which the molten alloy is held at a uniform level.

Dies as large as 8½" long x 6" wide x 5" thick can be used.

Special Titration Flask

A special titration flask, designed by H. J. Almquist for titrating buffered, colored and turbid solutions to a definite endpoint, as determined by comparison against LaMotte permanent color standards, is made by the LaMotte Chemical Products Company, Baltimore, Md. It is a 250 cc. Erlenmeyer flask to which has been attached a special side arm of the same dimensions and capacity as the standard LaMotte (10 cc.) test tubes.

In using the flask the indicator solution is added to a known volume of the solution to be titrated so as to make the

Almquist Titration Flask

concentration of the indicator the same as that in the comparator standard tube. The extract is now titrated with standard acid or base which has been made up containing the indicator in the same concentration as that in the comparator tube. By this procedure the indicator concentration is automatically kept constant.

From time to time the color of the titrated solution is observed by simply tilting the flask until the solution partly fills the side arm tube, which is then inserted in the standard LaMotte block comparator and compared with the indicator color standards in the manner described for testing colored and turbid solutions. This procedure is said to be of especial value where it is desired to adjust a sample of nickel plating bath from one pH value to another.

Bronze Castings

Art in Bronze Company, Inc., 1621 East 41st Street, Cleveland, Ohio, has developed a new method of making non-ferrous castings, particularly match plates and pattern castings under pressure in a composition mold. It is stated that one of the advantages of this process is the total elimination of shrinkage at the plate line usually found in sand cast plates. A cost tabulation gives the comparative expense of making match plates by sand casting match plates by the pressure cast method, showing a saving of about 15 per cent for pressure casting.

For other castings the cost of the

pressure cast method is slightly greater but it is claimed that the resulting casting is so far superior that the additional cost is often justified.

Industrial Arts Show

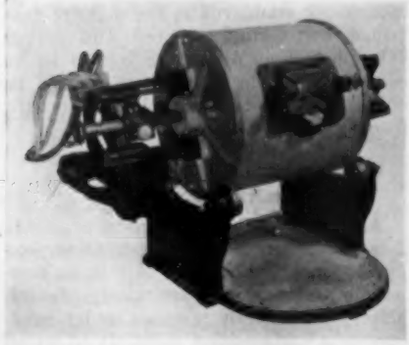
"Art in Industry" will be the theme of an exhibition to be held by the National Alliance of Art and Industry, at Rockefeller Center, New York, April 3 to 30. It has been organized by a group of leading industrial designers to stress the importance of design in industry; to demonstrate sales value of beauty; to emphasize the trend toward a national style. Articles to be shown must have design as an element, be intended for mechanical reproduction, being either already produced or in process of production. Metal products will be prominently displayed.

Executive committee includes Walter Teague, designer of super-railroad cars, Russel Wright, New York metal products designer, and others. Alon Bement, director of the National Alliance of Art and Industry, 1712 R. C. A. Building, 30 Rockefeller Plaza, New York, has charge of the details.

Small Electric Furnace for Nonferrous Work

A new rocking electric furnace, of 25 to 100 pounds capacity, has been announced by the Detroit Electric Furnace Company of Detroit, Mich. The unit has been designed for either production or experimental melting of small lots of such metal as copper, brass, nickel, aluminum or precious metals.

Except for size, the furnace is said to be a faithful reproduction of the larger rocking electric furnaces and, according to the manufacturer, will provide the speed, economy, and analysis control for which these furnaces are well known.



Small Detroit Furnace

"The keen interest of college engineering shops and laboratories in recent metallurigical developments has prompted the production of this small furnace as a part of our standard line. The requirements for speed in melting and shorter cycle heat treatment have given electric furnace metal an enormous advance, especially in the ferrous field," says E. L. Crosby, president of the Detroit Company. "Since we built the first of these furnaces, we have been told by many production and jobbing foundry superintendents and metallurgists that they wanted one of these units as a pilot implement to direct large production runs, as well as for quick special heats of 50 to 100 pounds."

The furnace is completely equipped with transformer, control panel, switches, meters and rocking mechanism. It has a nominal electrical rating of 20 kilowatts and may be connected to any industrial power supply.

Agitators and Filters for Plating Solutions

The Alsop Engineering Corporation, 39 West 60th Street, New York City, manufacturers of a variety of liquid handling and liquid processing equipment, some of which, they state, is peculiarly applicable to electroplating operations.

One type of equipment is a line of portable electric mixers which consists of a motor, direct connected through a special reducing gear to a shaft to which are attached two propellers. The special feature of this mixer is that the propellers are of the "push-pull" type. As shown in the illustration, the bottom propeller forces the solution upward while the top propeller forces it downward. These two opposing systems working against each other between the two propellers and then against the sides of the tank, result in a most effective mixing action. The design of the equipment is simple, eliminating as it does, shafting, belting, exposed gears, large motors, side stuffing boxes and the costly waste of running machinery while not actually mixing liquids. The mixers can be clamped to any tank, vat, barrel and crock or any other container.

The model recommended for most plating operations is their No. 6, using a 1/3 h.p. enclosed motor and an 8 inch propeller. The shaft and propellers may be made of any suitable material to resist the action of the solutions, such as Monel metal or bronze covered with hard rubber, antimonial lead, etc.

At times special processes and unusual requirements make necessary some form of propeller action other than the "push-pull" system. In cases of this kind, the Alsop Engineering Corporation is ready to design and specify the proper equipment for such special work.

Another piece of equipment which fills a real need in the electroplating plant is their asbestos disc filter. The filters are made in three sizes from a portable "Two-Disc" bench type up to large units having as many as 100 discs. Each disc used filters independently, and consequently the greater the number of discs, the greater the batch capacity.

Pump units are supplied assembled on the filters with capacities ranging from one gallon per minute to twenty gallons per minute for thin free-flowing liquids, such as electroplating solutions.

The discs are easily replaceable and inexpensive, and the filters are easily cleaned, thus, it is claimed, making it perfectly practical to use one filter in a plant employing a variety of solutions.

In these filters the pump and other parts can be made of the material best suited to resist the action of the solutions to be filtered.

Alsop Portable Electric Mixer

Metallic Zinc in Rust-Inhibitive Paints

In the field of metal protective paint finishes, metallic zinc powder paints are said to be rapidly gaining favor as both a primer and a finish coat. The New Jersey Zinc Company, 160 Front Street, New York, has made frequent inspections and careful studies of many panels, industrial buildings and steel structures painted with metallic zinc powder paints. The results of these tests, it is stated, have consistently shown the superior rust-inhibitive qualities of metallic zinc powder paints. These paints are usually pigmented with combinations of metallic zinc powder and zinc oxide.

Zinc is stated by the U. S. Bureau of Standards (Circular 80 Page 4) to be by far the best metallic coating for general rustproofing of iron and steel. This statement is based largely on the chemical nature of zinc, which is the only one of the commonly used metals that exerts a "galvanic" action tending to prevent the formation of rust even where a small area of the underlying iron or steel is exposed to the atmosphere. Laboratory tests show that this same characteristic of zinc is present to some degree when metallic zinc powder is placed in contact with metal surfaces, and there is evidence that some of the protection afforded by

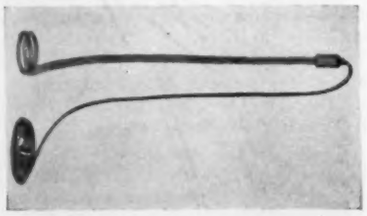
metallic zinc powder paint is the result of this electrochemical action of the pigment.

Metallic zinc powder paints are said to be easy to formulate and to apply. Until recently the storage of such paint was a problem to the manufacturer, due to the formation of gas pressure within the container when certain highly acid vehicles were used. The New Jersey Zinc Company has perfected a new and improved metallic zinc powder which has largely eliminated gas evolution in paint made from this pigment. The manufacturer can now formulate without storage difficulties, metallic zinc powder paints in many types of liquids, such as straight raw linseed oil or many synthetic resin vehicles.

Another feature of metallic zinc powder paint is its adhesion. Performance has shown, it is claimed, that metallic powder zinc—zinc oxide paint has this property to a much greater degree than other commonly used metal priming paints.

Small Heating Units for Corrosive Solutions

To retard chemical action on lead-sheathed units used for heating corrosive solutions such as pickling and plating baths, the General Electric Company, Schenectady, N. Y., has developed a new heating unit which contains a sheath-wire winding about which is cast a heavy block of lead. The new unit has a low watt density of 13 watts per



New G. E. Solution Heaters

square inch of immersed surface, a factor which should greatly increase the life of the device.

The company has also announced a new copper-sheathed unit to meet the need for a heating device which can be carried about, placed in almost any vessel containing water, and plugged into an ordinary power circuit to heat the water. It is formed in a self-supporting helix with long vertical extensions ending in a sealed-plug socket. Only the spiral is active; thus a vessel need not contain more than approximately five inches of water to permit use of the unit. This device has a rating of 1,300 watts at 115 or 230 volts.

Another General Electric heating unit recently designed is made entirely of Monel metal which does not stain linseed oil when heating the oil in the manufacture of ink, varnish, etc. Although electric heat is particularly valuable for such applications because of the need for accurate temperature control, ordinary metal-sheathed units would discolor the oil. This unit has a rating of 12 kw. at 230 volts, d-c., and one or three phase, a-c.

Equipment and Supply Catalogs

Buffing and Polishing Methods. Lea Manufacturing Company, Waterbury, Conn. A 56-page book for handy reference on use of various Lea compositions and compounds for all types of materials, metallic and non-metallic. This is the third edition, representing several years' experience and compilation. (79)

Flooring. Continental Asbestos and Refining Company, 1 Madison Ave., New York. Circular on "Stonoleum," an industrial flooring compound. (80)

Industrial Safety. National Safety Council, 20 N. Wacker Drive, Chicago, Ill. Circulars on safety pamphlets and instruction cards. (81)

Control of Industrial Research. Metropolitan Life Insurance Company, New York. Survey of research practices of 45 manufacturing organizations. (82)

Tires. The B. F. Goodrich Company, Akron, Ohio. 1934 issue of truck and bus operators' handbook, giving good tire information. (83)

Rotary Pumps. Roots-Connersville Blower Corporation, Connersville, Ind. Bul. 60-B10, illustrated. (84)

Aluminum Paint Vehicle. Quigley Company, Inc., 56 W. 45th St., New York. Bulletin on No. 44 black anti-corrosive vehicle. (85)

Cadmium Plating. Grasselli Chemical Company, Inc., Cleveland, Ohio., 30-page bulletin giving complete data on "Cadalyte" process and products, completely illustrated. Includes data on properties of cadmium, tests of plate, solution maintenance and other phases. (86)

Motors. Louis Allis Company, Milwaukee, Wis. Bulletin 505-C, 8 pages, illustrated, showing detailed construction of squirrel-cage motors. (87) Also, January-February issue of The Louis Allis Messenger, devoted to developments in motors. (88) (87), (88)

Electric Furnaces. Otto Junker, G.m.b.H., Lammersdorf (Kreismonschau), Germany. Illustrated bulletin on many types of industrial furnaces. (89)

Pumps. Worthington Pump and Machinery Corporation, Harrison, N. J. Bulletin W-318-S3B, illustrated; centrifugal, two-stage volute pumps. (90)

Flow Meter. Brown Instrument Company, Philadelphia, Pa. Illustrated bulletin on electric instrument for flow measurement and control. (91)

Lathes. South Bend Lathe Works, South Bend, Ind. Catalog 94, for 1934, complete and illustrated; 72 pages. (92)

Paper Testing Instruments. Thwing Instrument Company, Lancaster Avenue at 34th Street, Philadelphia, Pa. Illustrated circular, P-340. (93)

Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa. Catalog 33-200, Small Oil Circuit Breakers (94); Explosion-resisting squirrel cage motors. (95) (94), (95)

Forging Machinery. National Machinery Company, Tiffin, Ohio. Illustrated 28-page bulletin on "What Is a Modern Forging Machine?" (96)

Plating Barrels. Hanson-Van Winkle-Munning Company, Matawan, N. J. Circular, completely illustrated. (97)

Welding Timer. Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa. Bul. L20616. For spot welding. (98)

Save time. Use the coupon below to get any of the above catalogs or bulletins, or for data on any subject not mentioned this month. METAL INDUSTRY will see that you get them promptly.

METAL INDUSTRY
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(Insert below the number in parentheses at end of each item desired.)

I wish to receive the following bulletins mentioned in DECEMBER: .....

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I want information on the following equipment or materials also: .....

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News of Associations

American Electroplaters' Society

Convention News

The annual convention of the Electroplaters' Society will be held at Detroit, Mich., this year, making it the third time the Society has selected this great industrial center for its meeting place. The event will take place June 11-14, with the Statler Hotel as headquarters. Anyone who has been to a convention of the A. E. S. in Detroit before knows he can expect much from the next one. The city, furthermore, is very central insofar as industry and commerce are concerned, and it looks as though the attendance will make a good showing, what with the depression gone and things well on the upturn. Special hotel rates have been arranged with the Statler, from $2.50 up.

The Program Committee is steadily working out the technical program, and it urges all platers interested in the Society and their industry to prepare papers. These should be communicated by title to the committee, care of the undersigned, for proper mention in the program. All practical platers are urged to prepare papers, especially on their own problems and special work. These will be of great interest not only to other platers but to the technicians present as well.

It is also urged that platers prepare exhibits to show at the convention. As it incidentally advertises the products shown, platers should have no difficulty in approaching their employers about such exhibits. The exhibits are always an important part of the convention, attracting great attention and bringing out much valuable information which platers are generally glad to exchange. It benefits the firms they work for also, as they come back with improved knowledge. This, of course, is true of the convention in general. It is a by-word that the A. E. S. conventions are more businesslike and technical and educational than ordinary get-togethers. It is safe to say that it will pay any employer to send his plater to the convention.

A list of committees and their chairmen follows:

Finance, W. W. McCord.
Programs, Charles Eldridge.
Registration, Edward Klatzke.
Entertainment, H. M. Cherry.
Exhibits and Publicity, T. C. Eichstaedt.
Transportation, C. L. Southwick.
Ex-Officia, Co., J. H. Hansjosten, president, and A. G. Spence, vice-president, respectively, Detroit Branch.

All matters pertaining to the convention can be addressed in care of the undersigned at the Hotel Statler, Detroit, Mich. F. J. H.

Milwaukee Branch

Everyone interested in the electrodeposition of metals is invited to attend the annual educational session and smoker of the Milwaukee Branch, A. E. S., on Saturday evening, April 7th, at Lipps Hall, N. W. corner Highland Avenue and North Third Street, Milwaukee, Wis. The educational session will commence at 7 P. M. Buffet lunch and refreshments will follow.

George B. Hogaboom of Hanson-Van Winkle-Munning Company, Matawan, N. J., known to all platers, will talk on: "The Results of the Recent Exposure Tests of Electroplated Coatings." This will be illustrated by panels plated with nickel, copper and chromium in several ways, that were exposed at Key West, Fla., Sandy Hook, N. Y., New York City and Pittsburgh, Pa. Some lantern slides will also be used to illustrate this talk.

Gustave Soderberg of Udylite Process Company, Detroit, Mich., will talk on "Cadmium Plating Developments."

Milwaukee Branch will entertain their friends and guests in a fashion that has made the Branch smokers famous. Come and meet your fellow platers to discuss your plating problems.

Address communications to Dan Wittig, 1221 North 3rd Street, Milwaukee, Wis. The Committee.

Newark Branch

The Newark Branch, A.E.S., will hold its annual meeting at 2 P.M., Saturday, April 7, at the North End Club, North Broad Street and Third Avenue, Newark, N. J. There will be a good educational program.

In the evening there will be a stag entertainment. A fine time is promised by the committee. Tickets at $3 can be obtained from Horace Smith, 208 North Third Street, Newark. It is expected that about 300 will attend. Members and guests at the educational session in the afternoon will find dinner available at the Club.

Everyone interested in plating and finishing is urged to attend the session and stay for the entertainment. The North End Club is reached from downtown Newark by taking the North Newark bus at Hudson tube station.

Fellowship Club

The International Fellowship Club, organization of plating supply and equipment representatives, will hold a meeting April 7 at the North End Club, Newark, N. J., in connection with the annual meeting of the Newark Branch, A.E.S. (See above).

Philadelphia Branch

The February 16 meeting was well attended, and heard a good technical talk by George B. Hogaboom of Hanson-Van Winkle-Munning Company, Matawan, N. J., whose subject was, "Results of Exposure Tests Made at the Bureau of Standards."

George Gehling, Librarian.
5001 Tulip St., Philadelphia, Pa.

Jewelers Board of Trade

The Jewelers Board of Trade, which is the name under which the organization comprising the former Manufacturing Jewelers Board of Trade and the National Jewelers Board of Trade now operate as one group, last month elected officers for three years, as follows:

Edwin H. Cummings of The General Chain Company, North Attleboro, Mass., president; Alfred K. Potter of The Gorham Company, Providence, R. I., first vice-president; Harold L. Carpenter of Albert Walker Company, Providence, second vice-president; Horace M. Peck, secretary and treasurer; F. M. Andres, assistant treasurer; R. C. Knox, assistant secretary. The Executive Committee consists of Mr. Cummings, Edgar M. Docherty, retiring president, and Frederick A. Ballou, Jr.

Oil Burner Association

A program designed to give every member of the oil heating industry a first-hand and close-up view of the nation-wide activity of the Oil Burner Code Authority featured the national show and convention of the American Oil Burner Association, held the week of March 5 to 9 in Philadelphia, Pa.

Among the exhibitors who are aligned chiefly with the metal industries were the Chase Brass and Copper Company, Waterbury, Conn., and the Detroit Lubricator Company, Detroit.

Waste Material Dealers

The National Association of Waste Material Dealers will hold its annual convention March 19-21, at the Hotel Astor, New York. The annual banquet will take place the evening of March 21. The annual meeting and election of officers will be held at 2 P. M., March 21. Following metal men have been nominated:

For President, George Birkenstein, S. Birkenstein and Sons, Inc., Chicago, Ill.; for directors: Samuel Greenfield, Samuel Greenfield Company, Inc., Buffalo, N. Y.; David Golub, Charles Harley Company, San Francisco, Calif.; Louis Lippa, Apex Smelting Company, Chicago, Ill.; John Fegley, White Brothers Smelting Corporation, Philadelphia, Pa.; Samuel Appel, Samuel Appel Company, Fort Wayne, Ind.; Harry B. Grevnin, National Smelting and Refining Company, Detroit, Mich.; Milton Levenson, Roxbury Iron and Metal Company, Boston, Mass.

Electrochemical Society

Members of the American Ceramic Society have accepted the invitation of The Electrochemical Society to meet at Asheville, N. C., April 26, 27 and 28, 1934. The headquarters of the meeting will be the Grove Park Inn. Special entertainment for the ladies is being provided.

There will be two main sessions, one on "Dieelectrics," sponsored by The Electrochemical Society, and the other on "Refractories," sponsored by the American Ceramic Society.

Aside from these two sessions there will be a discussion of the program and activities of the Tennessee Valley Authority, and an informal round-table discussion on "Electric Heat Applied to the Ceramic Industry," and a session devoted to miscellaneous electrochemical papers.

Personals

Harry C. Bernard

Harry C. Bernard, who recently joined the sales organization of the Magnuson Products Corporation, Brooklyn, N. Y., has been elected assistant treasurer of that company. Previously he was with Oakite Products, Inc., New York. Both companies are large producers of industrial cleaners.

HARRY C. BERNARD

Harry Bernard was originally a plater, and as such was very active in organizing educational work. He was a charter member of the National Electro-Platers' Society, predecessor of the present American Electroplaters' Society. In 1920 he acted as program and publicity manager for the convention of the American Electroplaters' Society, held at Rochester, N. Y. He was an early vice-president of the New York Branch, A. E. S. At that time he was plating and finishing superintendent for the Elite Novelty Company, Newark, N. J. He had previously been in a similar position with the Bommer Spring Hinge Company, Brooklyn, N. Y., and with Sargent and Company, New Haven, Conn.

After his association with the Elite company, Mr. Bernard went to the Oakley Chemical Company, which has since then become Oakite Products, Inc., and he has remained in the sales end of the finishing industry ever since. He was with Oakite for 16 years, as salesman, district sales manager and, finally, division sales manager.

D. L. Carlson has been reelected president and treasurer of Lundell-Eckberg Manufacturing Company, Jamestown, N. Y., makers of bronze casement windows.

William M. Lester has opened offices at 29 Broadway, New York, and will act as consultant on die and pressure casting of nonferrous metals. Mr. Lester has long been engaged in development of pressure casting methods for aluminum alloys, brass and bronze, the latter providing finished parts having dimensional accuracy of die castings and physical properties of forgings.

S. M. D. Clapper has been reelected president of General Refractories Company, Philadelphia, Pa., suceeding John R. Sproul, who has resigned and become assistant to the president. Mr. Clapper was formerly board chairman, which position remains vacant.

Albert J. Vits has been elected president of Aluminum Goods Manufacturing Company, Manitowoc, Wis., to succeed his brother, the late George Vits. **H. L. Vits,** vice-president and general superintendent, has been elected a director.

Kenneth E. Burgess, formerly technical director of The Zapon Company, Stamford, Conn., and more recently in charge of the lacquer division of Van Schaack Bros. Chemical Works, is now, in consequence of the transfer of that Division to Ault & Wiborg Corporation, a member of the technical staff of the latter organization. After taking degrees at the University of Toronto, Dr. Burgess started his professional career with duPont and Atlas Powder Company in high explosive work, but has devoted the last sixteen years to the lacquer field. As a member of the Ault & Wiborg organization, he will devote his time to sales service work on behalf of customers.

Revere Appointments

Revere Copper and Brass Incorporated, announces that J. A. Doucett, formerly vice president and general sales manager, has been appointed vice president in charge of sales. C. A. Macfie, formerly assistant sales manager, becomes general sales manager. Mr. Doucett will give special attention to matters pertaining to the Code of the Copper and Brass Mill Products Industry, as well as to company policies, and Mr. Macfie will devote his time to general company sales activities. Both men will be located at the Revere executive offices at 230 Park Avenue, New York.

Dr. L. C. Pan

Dr. L. C. Pan, technical director of the U. S. Research Corporation, Long Island City, N. Y., and instructor of electroplating in the City College of New York, has been elected a fellow of the American Association for Advancement of Science. Dr. Pan holds the following degrees: B.S. '19, M.A. '21, Soochow; Ch.E. '24, PhD. '26, Columbia. He is an honorary member of the American Electroplaters' Society and a member of the Electrochemical Society and

DR. L. C. PAN

of the Electrodepositors' Technical Society of England.

During recent years Dr. Pan has devoted his efforts to the field of electrodeposition of metals. He has been a frequent contributor to the technical journals, and his articles and researches published have been a great aid to the science and industry of electroplating.

Among Dr. Pan's recent developments as technical director of the U. S. Research Corporation have been the "U. S. Plating Control"—a system for analyzing and correcting plating solutions; "Coloral," a method for oxidizing and coloring aluminum; the "Cavity Scale" for the measurement of throwing power; and "Nickelux," a brightener for nickel plating.

C. O. Anderson has been elected vice-president and general manager of the Pyrometer Service and Supply Corporation, Cleveland, Ohio, high tem-

perature engineers. Mr. Anderson was formerly with Leeds and Northrup Company and then with Claud S. Gordon Company, Chicago, Ill., of which Pyrometer Service is a subsidiary.

Harold W. Faint, formerly engineer in charge of metallurgy and finishing problems for Crowe Name Plate and Manufacturing Company, Chicago, Ill., has joined the sales engineering staff of The Udylite Process Company, Detroit, Mich.

A. E. Baldwin, president and **L. K. Lindahl,** general manager of the Udylite Process Company, Detroit, Mich., are on an inspection trip during which they will visit prominent Udylite installations on the Pacific Coast, and make a survey of business conditions throughout the West.

Eyvind W. Petersen, Cunningham Road, Rockford, Ill., has been appointed representative of the St. John X-Ray Service, Inc., Long Island City, N. Y., in the Chicago-Milwaukee district. Mr. Petersen was connected for many years with Doehler Die Casting Company, and for the last eleven years was metallurgical engineer for Fairbanks, Morse and Company, Beloit, Wis. He is now a consultant to the nonferrous foundry trade.

Leon L. Hill, general purchasing agent for the Oneida Community, Ltd., Sherrill, N. Y., has been elected president of the First National Bank of Sherrill.

H. E. Searle, development and research department, The International Nickel Company, Inc., New York, will speak March 12th before the North Jersey Section, American Chemical Society, at the Winfield Scott Hotel, Elizabeth, N. J. speaking on "Corrosion Resistant Metals", a substantial portion of the talk will be devoted to corrosion testing procedure, and he will show a moving picture outlining methods used.

Obituaries

Otto J. Boettcher

Otto J. Boettcher, whose death in December was mentioned in these columns last month, was born in Wisconsin in 1890. In 1908 he arrived in Manitowoc, Wis., and after a business school course there he worked in automobile plants at Detroit and South Bend, Mich. He returned to Manitowoc later on, and took a position as tool and die maker with the Aluminum Goods Manufacturing Company there. In 1916 he went to become master mechanic of the Adding and Multiplying Machine Company at Green Bay, Wis. When he returned to Manitowoc again he became a tool and die maker for the Aluminum Specialty Company. When that company built a branch plant at Chilton, Wis., in 1919, Mr. Boettcher was made superintendent, the position he held at the time of his death.

Roland A. Foster

Roland A. Foster, president of E. L. Post and Company, New York, manufacturers of babbitt metal, died at Wallington, Conn., February 26, 1934. Mr. Post was prominent in Republican politics in southern Connecticut, and an active organizer of local athletics in Wallingford.

Henry Carl Meyer

Henry Carl Meyer, president of the Universal Brass Works, Indianapolis, Ind., died recently of heart disease. He was 53 years old. Mr. Meyer was a native of Indianapolis. He organized the brass company 11 years ago.

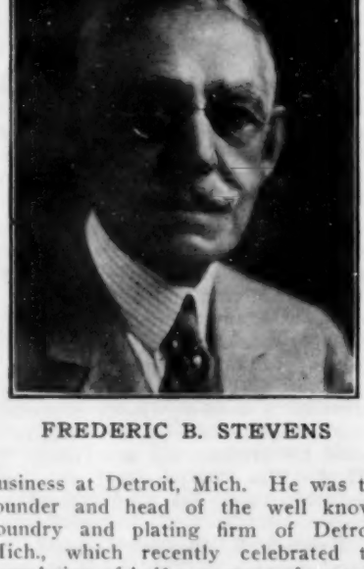
E. B.

Thornton H. Bissell

Thornton H. Bissell, advertising manager for The International Nickel Company, New York, since 1922, died of heart disease last month at his home in New York. He was 45 years old.

Frederic B. Stevens

As we go to press, news comes of the death on March 1, 1934, of Frederic B. Stevens, aged 78. Mr. Stevens was a pioneer in the foundry and plating equipment and supply



FREDERIC B. STEVENS

business at Detroit, Mich. He was the founder and head of the well known foundry and plating firm of Detroit, Mich., which recently celebrated the completion of half a century of successful activity.

Mr. Stevens was born and educated in Connecticut. In 1883 he moved to Detroit, and found employment in the foundry industry. After learning the foundry business, he went into business for himself, choosing the sale of pig iron and adding to his line foundry supplies. The firm prospered, largely through the efforts and progressive ideas Mr. Stevens put into it. Plating and polishing supplies and equipment were added. From selling, Mr. Stevens went into manufacture. The sale of refractory brick suggested the development and sale of face brick for ordinary building purposes, and Stevens vitrified face brick became a great success.

Today the Stevens firm has several large plants and warehouses, as well as general offices, in Detroit; a Canadian company warehouse and plant at Windsor, Ont.; and branches at Indianapolis, Ind., Erie, Pa., New Haven, Conn., and Toronto, Ont.

Additional details of Mr. Stevens' life will be published in an early issue.

Paul Maehler

Paul Maehler, president of the Paul Maehler Company, Chicago, Ill., manufacturer of foundry ovens and other industrial heat equipment, died January 25, 1934, aged 69. Mr. Maehler was in business at Chicago for over 50 years. His death came within a few hours after that of his wife, Mrs. Anna Maehler, aged 72.

Edward F. Wickwire

Edward F. Wickwire, vice-president in charge of sales of the Ohio Brass Company, Mansfield, Ohio, died February 24, 1934, at his home in Shaker Heights, near Cleveland. He was 58 years old, and had been in ill health for about a year. He was with the Ohio company for 28 years, and was widely known in the public utilities field.

Frank F. Bentley

Frank F. Bentley, for many years president of the Ohio Galvanizing and Manufacturing Company, Niles, Ohio, died February 15, 1934, aged 66. He was ill five days with heart disease.

William L. Hawkins

William L. Hawkins of 36 Duncan Avenue, Jersey City, N. J., a manufacturing jeweler, died March 1, 1934, aged 57.

Industrial and Financial News

Metal Monopoly Charged by Trade Commission

The Federal Trade Commission, Washington, D. C., last month issued a complaint charging the American Smelting and Refining Company, New York, with violation of the Clayton Act through acquisition recently of the Federated Metals Corporation, one of the largest scrap metal companies in the country, which formerly had headquarters in New York. The complaint alleged the companies formerly competed in the nonferrous smelting and refining industry, and that acquisition of Federated tended to a monopoly in A. S. & R.

American Smelting officials expressed surprise upon publication of the complaint, stating the action dated back to 1932 in part. They pointed out they had laid the plan for acquisition of Federated before the Trade Commission as well as the Attorney General and had heard no objections to it before they went through with the transaction. They also said there had been no substantial lessening in competition since the deal.

New Firm May Take Over Parker Job Plating

It is understood in Detroit that stockholders of Parker Rust Proof Company, Detroit, Mich., are considering organization of an affiliated company to take over the plating, enameling, Parkerizing and other metal finishing and metal treating business of the company, now carried on in Detroit on a jobbing basis.

"The businesses we propose to separate have nothing in common from an operating standpoint," W. M. Cornelius, president, said recently. "Our chemical business is protected by patents, while the jobbing business is highly competitive." F. J. H.

Murder in Latest Robbery of Tin in N. Y. Area

Murder was added to robbery when thieves entered the plant of the Columbia Smelting and Refining Company, Brooklyn, N. Y., early on February 24, killed the watchman and made off with eight to nine tons of solder and about 2½ tons of pig tin. Police believe it is the work of a gang well acquainted with metals, as only the best grade of metal was taken. Similar robberies (without murder, however) have occurred in recent months at four other metal plants or warehouses in recent months. The slain watchman was John Fient, who was apparently taken by surprise while eating his breakfast, and struck dead with a blunt instrument.

Other recent metal robberies in the New York area have been at the premises of Fitz, Dana and Brown; Hendricks Brothers; E. L. Post and Company; Marks Lissberger and Sons.

Alumilite Patent Holds

Aluminum Colors Incorporated, Indianapolis, Ind., announced last month that its basic patent, No. 1,526,127, on the Alumilite coloring process has been sustained by the United States District Court for the Eastern District of New York. The company is licensing others to use the process, which produces various colors on aluminum.

According to a statement from the United States Research Corporation, Long Island City, N. Y., the suit was limited to Claims 5 and 10 of the patent. Claim 5 of the patent relates to the process of electrolytically forming an oxide coating on an aluminum article and coloring with a lake forming dye. Claim 10 relates to an article thus coated and dyed. The opinion Judge Byers handed down February 13th, 1934, held Claims 5 and 10 of the Flick patent valid and infringed. Other claims of the patent were not sued upon, and the United States Research Corporation may continue to use their "Coloral" process for the plain coating, but may not color it, unless, on appeal, Judge Byers' decision is reversed.

Carbide Metal Labs Move to Niagara Falls

Union Carbide and Carbon Corporation, New York, will remove all of its metallurgical laboratories from Long Island City, N. Y., to Niagara Falls, N. Y., as soon as a new building is erected there to house the plant unit. Five other units are now at Buffalo. The new unit, to be erected on Royal Avenue, will cost $200,000 and employ over 100 men, according to H. L. Noyes, chief engineer of Carbide. Equipment is all to be moved, and no new equipment is to be purchased, it is stated.

Sly Co. Making Foundry Equipment 60 Years

This year marks the 60th anniversary of the founding of The W. W. Sly Manufacturing Company, Cleveland, Ohio, pioneers in foundry cleaning room equipment and dust collection. After a number of years in the foundry industry, W. W. Sly established his own business in 1874 for the manufacture and sale of tumbling mills of the exhaust type, which was his invention. He soon after developed the Sly cloth screen type dust arrester. This specialization in casting cleaning equipment soon lead to the first developments of the present extensive line of Sly blast cleaning equipment, and the dust collection line has extended into other industries.

The Sly organization comprises engineering facilities of considerable extent, and a manufacturing plant with modern facilities including a tin shop for dust piping systems, a sheet metal shop, a plate shop for light and heavy work, a structural shop, an extensive machine shop, and a wood working department. There are representatives in New York, Chicago, Detroit, Milwaukee, St. Louis, Minneapolis, Seattle, Los Angeles, Chattanooga and Houston, and in Toronto, Ontario. The main office and plant are at 4700 Train Avenue, Cleveland, Ohio.

Annual Earnings of Companies

Net profit unless preceded by (L) which means net loss.

	1933	1932
American Metal Co.	$ 103,217	(L)$2,256,630
American Smelting and Refining Co.	6,010,383	(L) 4,506,175
Baltimore Tube Co.	(L) 1,377	(L) 247,121
Bohn Aluminum & Brass Corp.	1,494,552	(L) 720,568
Canadian Bronze Corp.	110,441	121,867
Driver-Harris Co.	132,581	(L) 378,671
General Bronze Corp.	39,249	148,384
General Cable Corp.	(L) 2,044,186	(L) 5,023,840
Landers, Frary and Clark	236,409	(L) 75,915
Lunkenheimer Co.	36,951	(L) 686,284
McCord Radiator Mfg. Co.	24,757	(L) 649,109
Mueller Brass Co.	29,060	(L) 309,851
National Bearing Metals Corp.	358,983	(L) 162,302
National Lead Co.	3,828,329	2,711,604
New Jersey Zinc Co.	3,994,072	2,013,120
Ohio Brass Co.	54,262	(L) 878,828
Oneida Community, Ltd.	405,922	(L) 1,072,520
Parker Rust Proof Co.	403,958	264,736
Savage Arms Co.	(L)236,325	(L) 349,373
Scovill Manufacturing Co.	305,688	(L) 1,322,933

Business Items---Verified

National Pressure Cooker Company, Eau Claire, Wis., plans to erect an aluminum foundry 80 by 120 feet. **C. Nelson** is general manager.

Barnes Manufacturing Company, Mansfield, Ohio, makers of pumps and sanitary ware, is now running in very good shape, according to T. L. Smith, who was recently made general manager. Company, formerly in receivership, was bought for $75,000 by its former officials. It operates a nonferrous foundry and machine shop, tool room, plating, polishing and grinding departments.

Waugh Brothers, Ltd., Almonte, Ontario, reports that its foundry plant has not been damaged by fire as erroneously reported by trade newspapers recently. According to **Russel E. Waugh,** an official, part of the building had been washed away by water before the Waugh company bought it. The plant is built out over the Mississippi River for water power purposes. Last summer the company rebuilt part of the damaged section, and will finish it this summer.

Ampco Metal, Inc., South 39th and West Burnham Streets, Milwaukee, Wis., reports business in 1933 was 60% ahead of 1932. Company has made J. Guy Griffith its Pittsburgh, Pa., district representative, with headquarters in the Nixon Building there. Company operates nonferrous foundry.

John D. Helms, Charlotte, N. C., operating complete brass and aluminum foundry, reports rapidly expanding business. Plant specializes in all types of nonferrous job work.

E. F. Houghton and Company, Philadelphia, Pa., oils and mechanical leather goods, has reelected officers for 1934, headed by **Louis E. Murphy,** president.

Slack-Horner Brass Manufacturing Company, Denver, Colo., has moved to 1130 12th Street from former location at 1638 Blake Street. Company operates complete nonferrous foundry, machine shop, plating, polishing and lacquering departments.

The annual stockholders' meeting of **Farrel-Birmingham Company, Inc.,** Ansonia, Conn., was held February 15. Officers and directors were re-elected.

Stainless Steel and Aluminum. Texas-Pacific Railway will soon operate a stainless steel air-conditioned train at over 75 M.P.H., on a daily 500-mile run. The train has many aluminum parts to lighten it.

Five tons of **aluminum alloy** were used to make 1,000,000 "lucky piece" tokens to be given away in commemoration of completion of the new, high-speed, light-weight streamlined Union Pacific passenger train, in which light alloys were used wherever possible.

Heating and Ventilating Exposition

The extensive use of nonferrous metals in practically all forms in a rapidly growing industry was amply demonstrated at the third International Heating and Ventilating Exposition, held at New York in February. About 54,000 people attended the show. The metal products shown consisted of several large groups—heaters, refrigerators, duct systems, blowers, radiators, grilles, control instruments and devices, motors, and a variety of fittings and accessories. Among the exhibitors directly in the metal lines were The American Brass Company, Waterbury, Conn.; Chase Brass and Copper Company, Inc., Waterbury, Conn.; Eagle-Picher Lead Company, Chicago, Ill.; Reynolds Metals, Inc. Other exhibitors included The Bristol Company; L. O. Koven and Brothers, Inc.; Sarco, Inc.

New Incorporations

Metro-Metal Manufacturing Company, 1326 East Woodridge Street, Detroit, Mich.; manufacture metal products, operating tool room, stamping, plating, polishing, grinding departments; by **A. W. Shostak,** 3311 West Chicago Boulevard, and associates.

Smith-Mayer Corporation, 16374 Euclid Avenue, Cleveland, Ohio; industrial ovens, conveyors, air conditioners, etc.; by **J. C. Smith** and **C. F. Mayer.**

News From Metal Industry Correspondents

New England States

Waterbury, Connecticut

March 1, 1934.

During the past month, for the first time since early in November, local brass factories have been increasing their volume of business and number of employees. The Mutual Aid list, which had been increasing, in spite of the CWA work, began to grow smaller about the middle of last month, and since then each week has seen a decrease.

Local factories are said to be benefitting considerably by orders from Russia placed with munition firms that have in turn ordered brass in various forms from the local companies. It is also understood that they are receiving considerable orders from United States naval yards for construction of vessels recently authorized.

Scovill Manufacturing Company declared the regular common dividend of 25 cents, payable April 2.

Common creditors of **Beardsley and Wolcott Manufacturing Company,** which has been in receivership for over a year, submitted a plan to the local superior court to organize a corporation to take over the assets of the company. The creditors will make a cash offer of about $17,500 for all the assets of the business, will pay all receivership expenses and costs, and will make an adjustment with the city on the latter's claim for $55,000 in taxes. Five per cent of the creditors did not enter the agreement and will be paid a five per cent dividend at once. The court was told that the value of the assets at a forced sale is less than the total claims held by the common and preferred creditors, which amount to $350,000. The plant now employs about 180 persons. **James R. Sheldon,** who is also president of the **Waterbury Clock Company,** is president and receiver of the company. The business will be placed under entirely new management when the plan goes through. In the organization of the new corporation the old stockholders will be given some recognition.

Present officers of the **Waterbury Clock Company** were reelected at the annual meeting last month.

The fight between the officers of the Jewelry Workers' union and the **Waterbury Clock Company** continues. Last month, as a result of the union's protest, Elinor Herrick, chairman of the Regional Labor Board, criticized the company for not operating under the NRA, and yet seeking NRA protection from unfair trade practices. She asserted the company has refused to receive representatives of their workers who sought collective bargaining, and that following the long shut-down in December and January it hired back only those not belonging to the union; and that coercion was used to make the employees quit the union if hired back.

President James R. Sheldon denied the charges, saying that the company has dealt squarely and honestly with its employees and has not used coercion. He said the company is not obliged to negotiate with the workers, a statement that the Regional Labor Board admitted is true, because it had not signed the blanket code, and the clock code has not yet been approved. In spite of this however, he said, the company has never

refused to consult and confer with its employees, and had even conferred with representatives of the union. He said that practically all the members of the union have now been hired back.

It is understood that the **Waterbury Clock Company** which was experiencing poor business for several months, is now exceptionally busy. Over 2,700 persons are now employed there, compared with 1,200 a few months ago. The demand for the "Mickey Mouse" and "Three Little Pigs" watches is said to be so great that the company has difficulty in making them fast enough.

Benrus Manufacturing Company, which recently took over part of the former crystal factory of the Waterbury Clock Company, started operations last month with about 100 employees. It expects to increase this to 300 within a few months. **Benjamin Ozaroff** of New York is the general manager in charge of the local plant. The plant here will not manufacture watches for a time, but will manufacture watch cases, bracelets, and do much metal stamping, plating and enameling.

The New Haven chapter of the **American Society for Metals** held its February meeting at the **Bristol Company's** plant here. **Alvan L. Davis,** metallurgist of the **Scovill Manufacturing Company** was chairman of the meeting. **Marcus A. Grossman,** research engineer for the Illinois Steel Company, Chicago, spoke on "Alloying elements and Grain Sizes in Steel." **M. W. Brewster** of New Haven is president of the chapter, **R. T. Porter** of Bridgeport is vice-president, and **P. L. Clark** of Bridgeport is secretary and treasurer. Members of executive committee include **Arthur Bliss** and **L. V. Kunkel** of Waterbury. It was announced that among firms that have become sustaining members are the **Chase Companies, Inc.,** the **Waterbury Farrel Foundry** and the **Bristol Company.**

Plume and Atwood Manufacturing Company reelected officers last month. The financial statement for last year showed net earnings of $125,636 and dividends paid of $100,000. As a result the surplus was increased to $1,408,160.—W. R. B.

Connecticut Notes

HARTFORD—It was revealed before the House Naval Aeronautics Committee in Washington last month that **Pratt and Whitney Aircraft Company,** of this city, made almost three times as much profit on its sales to the Navy Department from 1927 to 1933 as all other manufacturers of airplane engines and airplanes combined.

BRIDGEPORT—Bridgeport Manufacturers' Association reports that there were 24,000 workmen in local factories February 1, as compared with 18,000 in the first week in January.

Underwood Elliot Fisher plans to tear down the former Smith and Egge factory here which it recently acquired.

NEW HAVEN—Elinor Herrick, chairman of the Regional Labor Board, announces that the board is investigating charges that **Whitney Blake Company** of this city is violating an agreement it made that strikers were not to be discriminated against after the settlement of the strike in November. **Fred B. Kingsbury,** secretary-treasurer of the company, denied that the company rehired strikers for a day and then discharged them, explaining that between 200 and 300 workers had been laid off because of curtailed production, and that there was no discrimination.

ANSONIA—The Pennsylvania Railroad has placed orders for more than one million pounds of copper wire and cable with six firms, including **Anaconda Wire and Cable Company,** and most of the latter concern's orders will be manufactured here. The wire and cable is to be used in electrification work now under way between New York, Philadelphia and Washington.

BRISTOL—New Departure Manufacturing Company, last month, secured a reduction in its assessment from the city to the amount of $1,035,815, based mostly on inventories. A few days later the Board of Relief ordered the officials to appear at a hearing to show cause why the assessment of the company should not be raised. If the board raises the assessment it is understood the company will appeal to the Superior Court.

TORRINGTON—Sydney French of Manchester, Conn., has been appointed general superintendent of the **Hendey Machine Company.** He has had several years' experience in the manufacture of high grade machine tools and gauges, and was an executive with **Pratt and Whitney Company,** Hartford, for some time.

MERIDEN—Parker Brothers Company, gun manufacturers, are putting out a new target for rifle practice, called a "Gofort," an invention of **Fred Everett.** It is in the form of animals, life-like in action.

MIDDLETOWN—The receivership of the **Russell Manufacturing Company** has been lifted. **G. M. Williams,** formerly president of Marmon Motor, has been elected president and a director. **T. Macdonough Russell,** former president, has become chairman of the board. The company's statement, after paying receivers' indebtedness and bank loans, shows the company to have $3,199,817 capital and surplus. Current assets are $1,771,623 against current liabilities of $439,618.

BRISTOL—Quarterly dividends of 25 cents on common, payable March 15, and $1.75 on the preferred, payable April 2, were declared by the **Bristol Brass Corporation** last month. During the past year the concern resumed dividends on the common stock, making payments of $60,000 or $1 a share. The financial statement shows an increase of $220,970 in the surplus after dividends, depreciation charges and reserve charges. The operating net income for 1933 was $305,136, against a deficit the previous year of $120,523. W. R. B.

Providence, Rhode Island

March 1, 1934.

Beneficial effects to industry and commerce under the NRA in Rhode Island were emphasized by representatives of five major industries in talks on February 5 before the Town Criers of Rhode Island, an advertisers' organization. They declared their industries are solidly behind the NRA. Among the speakers were **Edward O. Otis, Jr.,** secretary, **New England Manufacturing Jewelers' and Silversmiths' Association** and secretary, **Council of Jewelry and Allied Industries; Henry Buker,** chairman, supervisory agency, National Code Authority of the Machine Tool and Forging Machinery Industry, and vice-president of **Brown & Sharpe Manufacturing Company.** The latter said every member of the machine tool and forging machinery industry was 100% back of the code and greatly satisfied with its operation. The only danger, he declared, was the possibility of further reduction in working hours and subsequent further increase in cost of production which might result in a drop in sales and force a reduction in production. Restriction to forty hours per week has increased employment and also raised cost of production, Mr. Buker pointed out. Should the manufacturers be forced to pass on to the consumer an even greater increase in the cost of production, purchases of machinery and small tools, which are essentially capital goods, might be further restricted, he said.

The first annual meeting of the Manufacturing Jewelers' Board of Trade since its absorption of the National Jewelers' Board of Trade was held January 26. (See p. 108).

Rhode Island's exports of machinery, jewelry and tools have doubled since the United States went off the gold standard and depreciation of the dollar abroad followed, according to the Providence Chamber of Commerce.

All manufacturing establishments operating under the factory inspection laws of Rhode Island and employing five or more persons would be required to post daily wage scales and schedules of times for starting work and for meals, under a bill that has been unanimously passed by the State House of Representatives and referred to the Senate for concurrent action.

Kenneth H. Hamblin, formerly for a number of years with the Rhode Island Malleable Iron Works, at Hillsgrove, R. I., has been named general superintendent of the **Thomas Devlin Manufacturing Company,** Burlington, N. J., one of the largest malleable, grey iron and brass foundry plants in the East.

Henry C. Spratley and **Arthur L. Spratley** own the **Converse Manufacturing Company,** manufacturing jewelers, 140 Orange Street.

Temple Sales Company, Providence, has been incorporated to conduct a manufacturing jewelry business; capital, $25,000 in 250 shares of preferred of $100 each, 100 shares no par common.

Bell Enameling Company, 46 Clifford Street, is owned and conducted by **Agath Bella,** 52 Harrington Street, Norwood.

Michael Vario, 65 Priscilla Avenue, is owner of **Daniel Jewelry Company,** 27 Daniel Avenue.

The jewelry lacquering plant of **Edwin J. Todd,** 9 Calendar Street, was sold at public auction by order of assignee **Arthur J. Levy,** on February 2, pursuant to an assignment for the benefit of creditors dated January 22.

W. H. M.

Middle Atlantic States

Trenton, New Jersey

March 1, 1934.

Foran Foundry and Manufacturing Company, Flemington, N. J., has raised the wages of its employees 50 cents a day. The pay was reduced that amount last August. Moulders will now get $4 a day. The company is very busy.

The Sussex County (N. J.) Tax Board has taken no action on the application of the **New Jersey Zinc Company** for reduction of assessment on property at Ogdensburg by $100,000. The company sought the reduction last year when a cut of $50,000 was allowed. The assessment has been placed at $2,530,000.

C. A. L.

Newark, New Jersey

March 1, 1934.

United States Steel Corporation and American Sheet and Tinplates Company, a subsidiary, both New Jersey corporations, have been named defendants in a patent infringement suit brought in Federal Court here by the **Cold Metal Process Company,** Youngstown, O. The plaintiff alleges the two companies infringed upon patents on metal rolling and extension devices, and asks for an injunction and an accounting of profits. No date was set for the trial.

Superior Bolt and Screw Company, Cleveland, Ohio, has leased a factory building on Jeliff Avenue.

It is announced that several industrial concerns here would seek funds from the Reconstruction Finance Corporation for alterations and enlargement of their plants.

Northern Incandescent Lamp Company, Newark, has been incorporated with 500 shares preferred and 300 shares common stock, to manufacture lamps.

C. A. L.

Central New York

March 1, 1934.

A pickup in the metal trades throughout Central New York is noted by **John D. Strain,** executive secretary of the **Utica Industrial Association.** Mr. Strain regards this as an encouraging sign because he looks upon the metal trades as the barometer of all industry, and as the most reliable indicator in the business field, he said. He believes, however, that early in March when the heads of the codes meet to shorten hours and raise wages the present impetus that business has gradually gained during the past few months may be slowed down to a considerable degree because of the anxiety of business executives who may be reluctant to push their factories until they become more familiar with the effects of the new schedule.

New York Central reports a gradual increase in freight in and out of Utica.

George Shanahan, vice-president and general manager of Motors Metals Manufacturing Company, Detroit, will become general manager of the **Bossert Corporation,** Utica, on March 1, to succeed the late James R. Jones. The new manager has an exceptional record in the stamped metal manufacturing field. Before his eight years with Motors Metals he was manager of the Murray Company, Detroit. **Francis K. Kernan** has been elected president of Bossert Corporation, and **Gilbert Butler,** vice-president and secretary-treasurer.

Edward B. Folley, Binghamton, was elected president of the **Heating Piping and Hot Air Conditioning Contractors Association** of New York State at its 33d annual convention in Utica.

William H. Peck, 60, traffic manager of the **Oneida Community, Ltd.,** who was stricken in January, died late in February.

Mrs. Lillian Smith who retired from employ of **Oneida Community** several years ago and who died last December, was supposed to have passed away without leaving her relatives any money. A sister and brother early in February found $10,000 which she left in a trunk, in cash, stocks and bonds.

E. K. B.

Middle Western States

Detroit, Michigan

March 1, 1934.

Activities in the metal industries have developed into proportions that remind one of the old days. The bulk of the work centers in or around the motor car industry which is going at what might be called top speed. This however, does not mean that old time employment conditions prevail, but production is way up and great numbers of cars are being turned out and shipped promptly to all parts of the country. This means, of course, demands on accessory plants which are working almost to capacity in some parts of Detroit and surrounding territory. How long will this run continue? Maybe a few weeks, maybe well along into the summer.

The plants are buying large quantities of supplies—brass, copper, aluminum, lacquer, paint—everything that goes to make up the motor car. But extreme caution is, of course, being exercised in releasing contracts. Buying is held strictly to current requirements. There is no stocking, every thought being centered on quick turnover.

Plating plants in every part of this area also show renewed activity. Many plants are rushed with work, much of which is for motor car production.

Detroit, is now experiencing a rush of outside workers, both skilled and unskilled. Here is a word of warning: Detroit still has thousands of unemployed. Persons from outside seeking employment here have almost no chance at all. Applicants must make positive showing that they have been living in Detroit for at least a year to get consideration. The influx of workers from cutside is causing considerable concern, taxing the Public Welfare Department to the limit to furnish relief.

Facilities of the **Ford** aircraft plant at Dearborn, Mich., have been offered to the Government for fabrication of a proposed airship suitable for pioneering a dirigible service between the United States, South America and Africa. The offer was made by **Edsel Ford,** it is stated, in connetion with a proposal by **Carl B. Fritsche,** president of the **Metalclad Airship Company,** to build a 100-ton ship from designs previously prepared for the Navy. Fritische's proposal, made recently to the Government, would require an appropriation of $4,000,000, which he seeks from the Public Works Administration. After fabrication here, it is said, the ship would be assembled at Scott Field, Ill.

January shipments by **Kelvinator Corporation** amounting to 12,132 refrigeration units, were 123% above those for January, 1933, and brought total shipments for the first four months of the company's present fiscal year to a point 33% ahead of the same period in the previous year.

A. C. McCord, president, **McCord Radiator and Manufacturing Company,** reported closing an agreement with Shell Oil to combine refrigeration equip-

ment with the Shell system for refrigerating trucks. "Petrogas," supplied under compression, expands in passing through the refrigerated truck body, creating refrigeration at a low cost, and is then led through control valves to the engine as a motor fuel.

January shipments of Murray Corporation of America exceeded any month in 1933 and business booked for the current quarter is practically three times the volume turned out in the first quarter of 1933, it is announced. The company's press shops are on a three-shift basis, and the body assembly and most other departments are working two shifts. Present employment is approximately 9,000 persons. F. J. H.

Toledo, Ohio

March 1, 1934.

Manufacturing activities in the metal trades have decidedly advanced within the last month. While progress is most pronounced in the motor car field, it has extended to nearly every other industry where metals are fabricated. Production of motor car accessories is more active now than at any time within the last two or three years. The upturn started more than a month ago. Notwithstanding the fine progress now underway, extreme caution is observed in the matter of purchases of raw materials. No surplus is allowed to accumulate. This concerns everything. Furthermore, there will be no overproduction.

Plating plants are more active than they have been within the last two years. Those not busy on motor car work have plenty to do in other lines, for it should be remembered Toledo is an extensive manufacturer of diversified products, particularly where plating is a prominent factor.

Industrial activities are rapidly relieving the unemployment problem. Outside seekers of work, however, are given little consideration, and in order to obtain employment a man must furnish conclusive proof that he has made Toledo his home for more than a year.

Manufacture of 5,000 to 7,000 automobiles and trucks by **Willys-Overland,** in conformity with an application made to the Federal Court a few weeks ago, now seems assured, it is stated. Officials of the company expect to have production under way within a few weeks. According to **David R. Wilson,** receiver in charge of operations, this means employment for about 2,500 men in Toledo, 600 in Elmira, N. Y., and 600 in Pontiac, Mich.

It is announced by **E. G. Biechler** that the year has started off well for the **Frigidaire Sales Corporation,** Dayton, a subsidiary of General Motors. January dollar volume for household electric refrigerators was 133% over January 1933, and dollar volume of commercial refrigeration sales was 43% over the same 1933 period.

Merger of the **Electric-Autolite Company** and the **Moto Meter Gauge and Equipment Company** is announced. An increase in capital stock of the Autolite from 1,000,000 to 1,500,000 shares to complete the deal also has been approved, the exchange of stock being made on the basis of 2½ shares of Moto Meter for each share of Autolite, it is reported. F. J. H.

Chicago, Illinois

March 1, 1934.

The **Aluminum Company of America** participated in the ceremonies attendant upon the initial run out of Chicago of the new stream-lined duralumin train built by the **Pullman Company** for Union Pacific. The new $200,000 train, whose three cars weigh only 85 tons, is the first of its kind. Aluminum is used not only in the construction, but in the decorations. It is powered by a 12-cylinder Winton engine, burning distillate. So pleased are railway officials with its performance that they have ordered a similar train of six cars and three Pullmans.

The 34th National Automobile Show staged by the Chicago Automobile Trade Association in February approached boom time sales records. The total value of cars sold at the show was around $2,500,000.

Tool makers and machinery manufacturers assert that greatly augmented business is not far off, pointing to the fact that little equipment has been purchased by manufacturers in recent years, and that with increased production new tools and machinery will be a necessity.

Illinois Manufacturers' Association reports an increase of 20 to 25 per cent in employment over January 1933, and factory employment in Kenosha, Wis., shows an increase of 30 per cent over the same period.

National Standard Company, Niles, Mich., has acquired the **Worcester Wire Works, Inc.,** Worcester, Mass., for a consideration of approximately $145,000.

W. H. Beal, president, **Auburn Automobile Company,** states unfilled orders on hand are the largest since 1931. Volume production on the new models began February 15. Auburn will introduce a new line of cars under a new name, according to **E. L. Cord,** board chairman.

A. E. Montgomery, 73, president, **Montgomery Elevator Company,** Moline, and an organizer and first president of the Elevator Manufacturers' Association of America, died last month of cerebral hemorrhage.

Leo W. Grothaus, Milwaukee, and **Robert M. Gaylor,** Rockford, have been elected to the executive committee of the **Machinery and Allied Products Institute. John W. O'Leary,** Chicago, heads the organization. R. G. K.

Pacific States

Los Angeles, Calif.

March 1, 1934.

Advance Welding Works has moved to 1815 East Washington Boulevard from former location on East 15th Street. **O. C. Temple** is owner.

Fairbanks Morse Company has moved its quarters here to 2401 Santa Fe Avenue.

Sutor Bilt Corporation, 2008 East Slauson Avenue, is making industrial dust collecting equipment.

Union Die Casting Company, 2269 East 51st Street, is manufacturing a dishwasher for attachment to hot water tap.

El Franco and Redondo have opened a welding shop at 1923 Brooklyn Avenue.

Lane Welding Shop has removed to 1140 East 42nd Street.

Crandall Manufacturing Company, 1512 West Slauson Avenue, is manufacturing grade crossing signal devices.

Southern California

Universal Microphone Company, Inglewood, is making all kinds of microphones.

Acme Electric Welding Company, 5621 Pacific Boulevard, Huntington Park, is making an electric welder for wire work, such as baskets and screens.

Lewis Aircraft Company has bought the Parker Ice Machine Company plant at San Bernandino, and is reported to be turning it into an airplane factory.

Northrup Corporation, Santa Monica, has acquired the **Pickwick Motor Coach Company** plant at El Segundo, and will make planes there.

William Haight, 612 North Normandie Avenue, Los Angeles, has invented a fog condensation device made partly of copper coils.

Ernest H. Adams, 2068 Belgrave Avenue, Huntington Park, has opened a plant for manufacturing and reclaiming pipe.

James H. Knapp Company, 4920 Loma Vista Avenue, East Los Angeles, is a new firm making hydraulic steering stabilizers for autos.

J. M. Huntington, La Canada, has enlarged his welding shop.

Southwest Welding and Manufacturing Company, 3201 Mission Road, Alhambra, will enlarge plant.

Northern California

Besler Systems, Oakland, is manufacturing steam engines for airplanes, trucks, buses, etc. Much of the actual manufacturing is done by **Davenport (Iowa) Locomotive and Manufacturing Corporation. Paul Doxey** is superintendent.

Conner Manufacturing Company, Natoma Street, San Francisco, is making machines for production of piston rings.

Don Angle, operating a welding shop at Los Nietos, is making tungsten carbide products. H. S.

Metal Market Review

March 1, 1934.

Business in metals was fair during February. Spasmodically the markets showed real activity, while the rest of the time dullness prevailed. Prices were not much changed from the preceding month, copper remaining at 8c. for electrolytic delivered Connecticut, lead at 3.90c. St. Louis, and zinc at 4.40c. St. Louis most of the month. Tin was slightly stronger in price, and silver was higher. Reports were current early last month that the leading interest's aluminum price had been shaded below the 23.30c. level which has officially held for some years on the 99 plus grade; rumor had it that as low as 20c. had been heard in the open market, and that the company had been meeting competition to some extent. Quicksilver was advanced and is now $74 to $75 a flask. Antimony is somewhat higher. The month's daily prices and averages are shown below, and last minute prices are on the opposite page.

Copper continues to be affected by code deliberations. A big hearing is due March 12. Consumers appear ready to enter the market for 8c. copper as soon as a clearer general situation is brought about by the industry.

Lead consumption of the country is currently placed at about 31,000 tons monthly. Producers are optimistically looking forward to spring business which will push shipments well above that amount. The price situation is quite steady with no noticeable selling pressure.

Zinc business improved somewhat last month, due chiefly to improved galvanizing operations in the steel industry. The price is holding quite steady.

Tin is also expected to benefit through expansion of activity in the steel industry, which is producing more tin plate. The price average rose slightly last month.

Aluminum production of the United States in 1933 was 85,126,000 pounds, valued at $16,174,000, the Bureau of Mines reports. This compares with 104,885,000 pounds, valued at $20,453,000 for 1932. About 51% of this new metal was made at Massena, N. Y. Without definite data, it was estimated that there was a drop last year in aluminum consumption for capital goods, and a small increase in use for consumer goods. Many new uses are being developed (see below).

The Government's gold quotation was unchanged throughout February at $35 an ounce.

Scrap metals have shown no violent price changes, but aluminum grades have been on the upward trend for some time. Prices are shown on the opposite page.

The Wrought Metal Market

March 1, 1934.

Prices of wrought metals were generally unchanged throughout February. Business has been feeling the effects of the general industrial revival, especially by the activity in the automobile industry. The copper wire mills took some good business last month from the Pennsylvania Railroad, which is electrifying between New York and Washington. Air conditioning of trains and other structures continues to take good amounts of nonferrous metal in various forms.

Increased operations are reported by metal working plants in the Connecticut Valley, Detroit, Cleveland, Chicago and Central New York areas.

Aluminum is going into consumption in the transportation field, as well as in a number of other lines. The Bureau of Mines report on the country's aluminum production last year (see above) included some interesting data on the new uses to which the metal is being put. Besides many that have been mentioned here from time to time, it is stated that the liquor lines are using considerable aluminum. Beds made of aluminum appeared last year, as did lawn mowers, rowboats, screen doors, snow plows and many other products heretofore made in other materials.

Brass Ingot Shipments

Thirty-six companies reporting to the Code Authority of the Brass and Bronze Industry shipped a total of 4,053 tons of ingots in January, 1934. Deliveries reported for December, 1933, by the Nonferrous Ingot Metal Institute, Chicago, Ill., totaled 2,145 tons.

Daily Metal Prices for February, 1934

Record of Daily, Highest, Lowest and Average Prices and the Customs Duties

	1	2	5	6	7	8	9	12*	13	14	15	16
Copper c/lb. Duty 4 c/lb.												
Lake (Del. Conn. Producers' Prices)	8.125	8.125	8.125	8.125	8.125	8.125	8.125	....	8.125	8.125	8.125	8.125
Electrolytic (Conn. Producers' Prices)	8.00	8.00	8.00	8.00	8.00	8.00	8.00	....	8.00	8.00	8.00	8.00
Casting (f.o.b. ref.)	7.75	7.75	7.75	7.75	7.75	7.75	7.75	....	7.75	7.75	7.75	7.75
Zinc (f.o.b. East St. Louis) c/lb. Duty 1¼ c/lb.												
Prime Western (for brass special add 0.05)	4.30	4.30	4.40	4.40	4.40	4.40	4.40	....	4.40	4.40	4.40	4.40
Tin (f.o.b. N. Y.) c/lb. Duty Free, Straits	51.00	50.00	50.80	51.05	51.25	51.35	51.50	....	51.55	51.45	51.625	52.05
Lead (f.o.b St. L.) c/lb. Duty 2½ c/lb.	3.90	3.90	3.90	3.90	3.90	3.90	3.90	....	3.90	3.90	3.90	3.90
Aluminum c/lb. Duty 4 c/lb.	23.30	23.30	23.30	23.30	23.30	23.30	23.30	....	23.30	23.30	23.30	23.30
Nickel c/lb. Duty 3 c/lb.												
Electrolytic 99.9%	35	35	35	35	35	35	35	....	35	35	35	35
Antimony (Ch.99%) c/lb. Duty 2 c/lb.	7.20	7.20	7.20	7.20	7.20	7.15	7.15	....	7.15	7.15	7.15	7.15
Silver c/oz. Troy, Duty Free	43.625	43.375	44.00	44.125	44.50	44.50	44.75	....	44.75	44.125	45.375	46.00
Platinum $/oz. Troy, Duty Free	38.00	38.00	38.00	38.00	38.00	38.00	38.00	....	38.00	38.00	38.00	38.00
Gold—Official Price[1] $/oz. Troy	35.00	35.00	35.00	35.00	35.00	35.00	35.00	....	35.00	35.00	35.00	35.00

	19	20	21	22*	23	26	27	28	High	Low	Aver.
Copper c/lb. Duty 4 c/lb.											
Lake (Del. Conn. Producers' Prices)	8.125	8.125	8.125	....	8.125	8.125	8.125	8.125	8.125	8.125	8.125
Electrolytic (Conn. Producers' Prices)	8.00	8.00	8.00	....	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Casting (f.o.b. ref.)	7.75	7.75	7.75	....	7.75	7.75	7.75	7.75	7.75	7.75	7.75
Zinc (f.o.b. East St. Louis) c/lb. Duty 1¼ c/lb.											
Prime Western (for brass special add 0.05)	4.40	4.40	4.40	....	4.40	4.40	4.40	4.40	4.40	4.40	4.384
Tin (f.o.b. N. Y.) c/lb. Duty Free, Straits	52.60	51.85	52.45	....	52.35	52.25	52.10	52.05	52.60	50.00	51.668
Lead (f.o.b St. L.) c/lb. Duty 2½ c/lb.	3.90	3.90	3.90	....	3.90	3.90	3.90	3.90	3.90	3.90	3.90
Aluminum c/lb. Duty 4 c/lb.	23.30	23.30	23.30	....	23.30	23.30	23.30	23.30	23.30	23.30	23.30
Nickel c/lb. Duty 3 c/lb.											
Electrolytic 99.9%	35	35	35	....	35	35	35	35	35	35	35
Antimony (Ch.99%) c/lb. Duty 2 c/lb.	7.15	7.20	7.20	....	7.20	7.20	7.225	7.25	7.25	7.15	7.172
Silver c/oz. Troy, Duty Free	46.75	46.00	46.375	....	46.625	45.875	45.75	46.375	46.75	43.375	45.233
Platinum $/oz. Troy, Duty Free	38.00	38.00	38.00	....	38.00	38.00	38.00	38.00	38.00	38.00	38.00
Gold—Official Price[1] $/oz. Troy	35.00	35.00	35.00	....	35.00	35.00	35.00	35.00	35.00	35.00	35.00

* Holiday. [1]United States Treasury price.

Metal Prices, March 5, 1934

(Import duties and taxes under U. S. Tariff Act of 1930, and Revenue Act of 1932)

NEW METALS

Copper: Lake, 8.125, Electrolytic, 8.00, Casting, 7.75. **Zinc:** Prime Western, 4.40. Brass Special, 4.45. **Tin:** Straits, 52.50. Pig 99%, 51.25. **Lead:** 3.90. **Aluminum,** 23.30. **Antimony,** 7.35. **Nickel:** Ingot, 35. Shot, 36. Elec., 35. Pellets, 40. **Quicksilver:** Flasks, 75 lbs., $75.00. **Bismuth,** $1.30. **Cadmium,** 55. **Silver,** Troy oz., official price, N. Y., Mar. 7, 46.00. **Gold:** oz., Troy, Official U. S. Treasury price Mar. 1, $35.00. **Scrap Gold,** 6½c. per pennyweight per karat, dealers' quotation, Mar. 7. **Platinum,** oz. Troy, $36-$38.

Duties: Copper, 4c. lb.; zinc, 1¼c. lb.; tin, free; lead, 2½c. lb.; aluminum, 4c. lb.; antimony, 2c. lb.; nickel, 3c. lb.; quicksilver, 25c. lb.; bismuth, 7½%; cadmium, 15c. lb.; cobalt, free; silver, free; gold, free; platinum, free.

INGOT METALS AND ALLOYS

	Cents lb.	U. S. Import Duty	Import Tax*
Brass Ingots, Yellow	6½ to 8	None	4c. lb.[1]
Brass Ingots, Red	8¼ to 10½	do	do
Bronze Ingots	9¼ to 12¼	do	do
Aluminum Casting Alloys	13 to 22	4c. lb.	None
Manganese Bronze Castings	20 to 34	45% a. v.	3c. lb.[2]
Manganese Bronze Forgings	26 to 38	do	do
Manganese Bronze Ingots	8¾ to 13	do	4c. lb.[1]
Manganese Copper, 30%	11½ to 16	25% a. v.	3c. lb.[2]
Monel Metal Shot or Block	28	do	None
Phosphor Bronze Ingots	9 to 12	None	4c. lb.[1]
Phosphor Copper, guaranteed 15%	12¼ to 15	3c. lb.[2]	do
Phosphor Copper, guaranteed 10%	11¼ to 14	do	do
Phosphor Tin, no guarantee	61 to 75	None	None
Silicon Copper, 10%	18 to 30	45% a. v.	4c. lb.[1]
Iridium Platinum, 5%	$37.50 to $39.25	None	None
Iridium Platinum, 10%	$38.50 to $40.50	None	None

*Duty is under U. S. Tariff Act of 1930; tax under Section 60 (7) of Revenue Act of 1932.
[1]On copper content. [2]On total weight. "a. v." means ad valorem.

OLD METALS

Dealers' buying prices, wholesale quantities:	Cents lb.	Duty	U. S. Import Tax
Heavy copper and wire, mixed	6⅛ to 6⅜	Free	4c. per pound on copper content.
Light copper	5½ to 5¾	Free	
Heavy yellow brass	3½ to 3¾	Free	
Light brass	3 to 3¼	Free	
No. 1 composition	5 to 5⅛	Free	
Composition turnings	4¾ to 4⅞	Free	
Heavy soft lead	3⅛ to 3⅜	2⅛c. lb.	None.
Old zinc	2¾ to 3	1½c. lb.	
New zinc clips	3⅛ to 3⅜	1½c. lb.	
Aluminum clips (new, soft)	14½ to 15½	4c. lb.	
Scrap aluminum, cast	11½ to 12¾	4c. lb.	
Aluminum borings—turnings	6½ to 7½	4c. lb.	
No. 1 pewter	30 to 32	Free	
Electrotype or stereotype	3 to 3¼	2⅛c. lb.*	
Nickel anodes	31½ to 33½	10%	
Nickel clips, new	34 to 36	10%	
Monel scrap	11½ to 19½	10% a.v.	

*On lead content.

Wrought Metals and Alloys

The following are net BASE PRICES per pound, to which must be added extras for size, shape, quantity, packing, etc., or discounts, as shown in manufacturers' price lists, effective since December 19, 1933, and revised March 5, 1934.

COPPER MATERIAL

	Net base per lb.	Duty*
Sheet, hot rolled	15c.	2½c. lb.
Bare wire, soft, less than carloads	12.25c.	25% a. v.
Seamless tubing	16¼c.	7c. lb.

*Each of the above subject to import tax of 4c. lb. in addition to duty, under Revenue Act of 1932.

BRASS AND BRONZE MATERIAL

	Yellow Brass	Red Brass 80%	Comm'l. Bronze	Duty	
Sheet	13¾c.	14⅜c.	15¼	4c. lb.	U. S. Import Tax 4c. lb. on copper content
Wire	14¼c.	15⅛c.	15¾	25%	
Rod	12¼c.	15⅛c.	15⅝	4c. lb.	
Angles, channels	21¾c.	22⅞c.	23¼	12c. lb.	
Seamless tubing	16¼c.	17⅜c.	17⅞	8c. lb.	
Open seam tubing	21¾c.	22⅞c.	23¼	20% a. v.	No tax.

NICKEL SILVER

Net base prices per lb. (Duty 30% ad valorem.)

Sheet Metal		Wire and Rod	
10% Quality	23 c.	10% Quality	25⅞c.
15% Quality	25⅛c.	15% Quality	30¼c.
18% Quality	26⅜c.	18% Quality	33½c.

TOBIN BRONZE AND MUNTZ METAL

(Duty 4c. lb.; import tax 4c. lb. on copper content.)

Net base prices per pound.	
Tobin Bronze Rod	15¾c.
Muntz or Yellow Rectangular and other sheathing	16⅞c.
Muntz or Yellow Metal Rod	13¼c.

ALUMINUM SHEET AND COIL

(Duty 7c. per lb.)

Aluminum sheet, 18 ga., base, ton lots, per lb.	32.80
Aluminum coils, 24 ga., base price, tons lots, per lb.	30.50

ROLLED NICKEL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Net Base Prices

Cold Drawn Rods	50c.	Cold Rolled Sheet	60c.
Hot Rolled Rods	45c.	Full Finished Sheet	52c.

MONEL METAL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Hot Rolled Rods (base)	35	Full Finished Sheets (base)	42
Cold Drawn Rods (base)	40	Cold Rolled Sheets (base)	50

SILVER SHEET

Rolled sterling silver (March 7) 48.00c. per Troy oz. upward according to quantity. (Duty, 65% ad valorem.)

ZINC AND LEAD SHEET

	Cents per lb. Net Base	Duty
Zinc sheet, carload lots, standard sizes and gauges, at mill, less 7 per cent discount	9.50	2c. lb.
Zinc sheet, 1200 lb. lots (jobbers' price)	10.25	2c. lb.
Zinc sheet, 100 lb. lots (jobbers' price)	14.25	2c. lb.
Full Lead Sheet (base price)	7.50	2½c. lb.
Cut Lead Sheet (base price)	7.75	2½c. lb.

BLOCK TIN, PEWTER AND BRITANNIA SHEET

(Duty free)

This list applies to either block tin or No. 1 Britannia Metal Sheet, No. 23 B. & S. Gauge, 18 inches wide or less; prices are all f. o. b. mill:

500 lbs. or over	15c. above N. Y. pig tin price
100 to 500 lbs.	17c. above N. Y. pig tin price
Up to 100 lbs.	25c. above N. Y. pig tin price

Lighter gauges command "extras" over the above prices.

Supply Prices on page 42

Supply Prices, March 5, 1934

ANODES

Prices, except silver, are per lb. f.o.b., shipping point, based on purchases of 500 lbs. or more, and subject to changes due to fluctuating metal markets.

Copper: Cast ..... 15¾c. per lb.
Electrolytic, full size, 11¾c.; cut to size 12c. per lb.
Rolled oval, straight, 15¼c.; curved, 16¼c. per lb.
Brass: Cast ..... 14¾c. per lb.
Zinc: Cast ..... 9c. per lb.
Nickel: 90-92% ..... 44c. per lb.
95-97% ..... 45c. per lb.
99%+cast, 47c.; rolled, depolarized, 48c.
Silver: Rolled silver anodes .999 fine were quoted Mar. 7, from 49.00c. per Troy ounce upward, depending upon quantity.

WHITE SPANISH FELT POLISHING WHEELS

Diameter	Thickness	Under 50 lbs.	50 to 100 lbs.	Over 100 lbs.
10-12-14 & 16	1" to 2"	$2.95/lb.	$2.65/lb.	$2.45/lb.
10-12-14 & 16	2 to 3½	2.85	2.55	2.35
6-8 & over 16	1 to 2	3.05	2.75	2.55
6-8 & over 16	2 to 3½	3.00	2.70	2.45
6 to 24	Under ½	4.25	3.95	3.75
6 to 24	½ to 1	3.95	3.65	3.45
6 to 24	Over 3½	3.35	3.05	2.85

Any Quantity

4 to 6	Under ½, $5.00	½-1, $4.85	1 to 3, $4.75
1½ to 4	" 5.55	" 5.40	" 5.35
1 to ½	" 5.85	" 5.70	" 5.60

Extras: 25c per lb. on wheels, 1 to 6 in. diam., over 3 in. thick.
On grey Mexican wheels deduct 10c. per lb. from above prices.

COTTON BUFFS

Full disc open buffs, per 100 sections when purchased in lots of 100 or less were quoted February 1:

14" 20 ply 84/92 Unbleached	$57.30-70.96
11" 20 ply 84/92 Unbleached	39.15-48.48
14" 20 ply 80/92 Unbleached	45.95-56.90
11" 20 ply 80/92 Unbleached	31.50-39.01
14" 20 ply 64/68 Unbleached	42.45-52.57
11" 20 ply 64/68 Unbleached	29.14-36.09
Sewed Pieced Buffs, per lb., bleached	40c. to 1.09

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone	lb.	.10½-.12½
Acid—Boric (Boracic) granular, 99½+% ton lots	lb.	.04½-.05
Chromic, 75 to 400 lb. drums		.15-.15¼
Hydrochloric (Muriatic) Tech., 20 deg., carboys	lb.	.03
Hydrochloric, C. P., 20 deg., carboys	lb.	.06½
Hydrofluoric, 30%, bbls.	lb.	.07-.08
Nitric, 36 deg., carboys	lb.	.05-.06¼
Nitric, 42 deg., carboys	lb.	.07-.08
Sulphuric, 66 deg., carboys	lb.	.02
Alcohol—Butyl, drums	lb.	.09½-.11
Denatured, drums	gal.	.475-.476
Alum—Lump, barrels	lb.	.03¼-.04
Powdered, barrels	lb.	.03½-.05
Ammonia, aqua, com'l., 26 deg., drums, carboys	lb.	.02½-.05
Ammonium—Sulphate, tech., bbls.	lb.	.03½-.05
Sulphocyanide, technical crystals, kegs	lb.	.50-.58
Arsenic, white kegs	lb.	.04½-.05
Asphaltum, powder, kegs	lb.	.23-.41
Benzol, pure, drums	gal.	.41
Borax, granular, 99½+%, ton lots	lb.	.02¼-.02¾
Cadmium oxide, 50 to 1,000 lbs.	lb.	.55
Calcium Carbonate (Precipitated Chalk), U. S. P.	lb.	.05¾-.07½
Carbon Bisulphide, drums	lb.	.05½-.06
Chrome, Green, commercial, bbls.	lb.	.21½
Chromic Sulphate, drums	lb.	.33-.55
Copper—Acetate (Verdigris)	lb.	.23
Carbonate, 53/55% cu., bbls.	lb.	.16-.18
Cyanide (100 lb. kgs.)	lb.	.39-.40
Sulphate, tech., crystals, bbls.	lb.	.0445
Cream of Tartar Crystals (Potassium Bitartrate)	lb.	.20¼-.20½
Crocus Martis (Iron Oxide) red, tech., kegs.,	lb.	.07
Dextrin, yellow, kegs	lb.	.05-.08
Emery Flour	lb.	.06
Flint, powdered	ton	30.00
Fluorspar, bags	lb.	.03½
Gold Chloride	oz.	$18.25*
Gum—Sandarac, prime, bags	lb.	.50
Shellac, various grades and quantities	lb.	.21-.31
Iron Sulphate (Copperas), bbls.	lb.	.01½
Lead—Acetate (Sugar of Lead), bbls.	lb.	.10-.13½
Oxide (Litharge), bbls	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.58
Methanol, (Wood Alcohol) 100% synth., drums	gal.	.42½
Nickel—Carbonate, dry, bbls.	lb.	.35-.41
Chloride, bbls.	lb.	.18-.22
Salts, single, 300 and 425 lb. bbls.	lb.	.12-.13
Salts, double, 425 lb. bbls.	lb.	.12-.13
Paraffin	lb.	.05-.06
Phosphorus—Duty free, according to quantity	lb.	.35-.40
Potash Caustic Electrolytic 88-92% broken, drums	lb.	.08-.093
Potassium—Bichromate, casks (crystals)	lb.	.08⅝
Carbonate, 96-98%	lb.	.08¾
Cyanide, 165 lbs. cases, 94-96%	lb.	.57½
Gold Cyanide	oz.	$15.45*
Pumice, ground, bbls.	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Rouge—Nickel, 100 lb. lots	lb.	.08
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in bbls.	lb.	.05-.07½
*Silver—Chloride, dry, 100 oz. lots	oz.	.32
Cyanide, 100 oz. lots	oz.	.46
Nitrate, 100 ounce lots	oz.	.28½
Soda Ash, 58%, bbls.	lb.	.0252
Sodium—Cyanide, 96 to 98%, 100 lbs.	lb.	.16½-.22
Beryllium fluoride ($2NaF.BeF_2$)	lb.	4.30-7.00
Gold Cyanide	oz.	$17.10*
Hyposulphite, kegs, bbls.	lb.	.03½-.06½
Metasilicate, granular, bbls.	lb.	3.55-3.70
Nitrate, tech., bbls.	lb.	.03¼-.07
Phosphate, tribasic, tech., bbls.	lb.	.03¾
Silicate (Water Glass), bbls.	lb.	.01½
Stannate, drums	lb.	.35-.40
Sulphocyanide, drums	lb.	.30-.45
Sulphur (Brimstone), bbls.	lb.	.02
Tin Chloride, 100 lb. kegs	lb.	.39
Tripoli, powdered	lb.	.03
Trisodium Phosphate—see Sodium Phosphate.		
Wax—Bees, white, ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½-.06
Zinc—Carbonate, bbls.	lb.	.11-.12
Chloride, drums, bbls.	lb.	.07½-.10
Cyanide (100 lb. kegs)	lb.	.38
Sulphate, bbls.	lb.	.03½

*Gold and silver products subject to fluctuations in metal prices.